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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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THE URGENT NECESSITY FOR AN INCREASE IN THE ARTILLERY.

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THE utter inadequacy of the existing artillery forces of the United States for national defense and the great danger arising from this condition is so little appreciated by the public that it is the duty of every one to do what he can to remedy the evil. Many professional artillerists and officers who are not artillerists have written on the subject, pointing out what should be done. It is hoped that the views contained in this article of one who is not identified with the army and who treats the matter solely from the standpoint of common sense and patriotism, may tend, to some slight extent, to aid these writers in creating in the public that knowledge of the situation and appreciation of the necessity of remedying it which must exist to secure from Congress the legislation which is indispensable to avoid a great menace to the nation.

As was stated in Lieutenant Carbaugh's article in the last number of the JOURNAL, the result of appeals for years from the authorities and their general support by the press and public has recently resulted in the adoption of a system for the recon-

struction of the coast defenses of the country upon modern lines. The system "includes over 500 high-power guns, 1000 twelve-inch mortars, and 360 rapid-fire guns, to be grouped at over 110 points in about 25 harbors." By June, 1898, one-half of these guns and mortars are expected to be in their emplacements. Added to this are to be 6000 submarine mines, supposed to be effective in preventing an attacking fleet from running past our forts, but which need themselves to be protected by artillery to be of any value for this purpose.

This has been an immense improvement in our national defenses. It has been fully sustained by public sentiment, and our people read daily with complacency of the erection of additional heavy guns at different points. But while this has been going on, and at a large expense to the country, the equally important work of providing the necessary force of artillerists, "the men behind the guns," without which the guns themselves are useless, has been practically neglected. The situation has considerable resemblance to what existed on the Pacific Coast at the time of the difficulty with Chili, when the port of San Francisco lay open to the raid of a single Chilian cruiser. The authorities then shipped with great haste from the East two high-power guns to defend the city. They, however, omitted to provide any carriages, and for want of the carriages the guns that were shipped were of no more value for the defense of San Francisco than if they had been so many logs of wood. The forts of our whole sea-coast are in about the same condition as San Francisco then was, for guns without gunners are of no more value than guns without carriages.

The calmness with which this condition of affairs is borne by the country is nothing less than wonderful. Our press and members of Congress are fierce to resent the slightest infringement upon "American rights," and we construe "American rights" to cover both North and South America. We apparently have cast off the restraint which diplomacy has imposed upon official communication between the representatives of civilized countries, to avoid increasing a pending difficulty by irritating the feelings of a proud nation, and generally conduct ourselves towards other nations in a way which, if done by one European country to another, would inevitably lead to war. It is

also by no means certain that Japan may not be quietly preparing another such military surprise for this country as she recently gave to China. Yet we are content to leave our defenses and our new high-power guns without men enough to keep them in order, not to mention using them as weapons, as if they were a sort of military scarecrows which would in themselves keep away an enemy, as a farmer's old clothes frighten birds away from his grain.

It is questionable in the writer's mind whether the results of our civil war have not been detrimental instead of beneficial to this country in a military sense. The present generation, who regard only the results, and know little about the details, are dazzled by the great marches and battles of Grant, Sherman and Sheridan, in the latter part of the war, and do not know or stop to think of the difficulties experienced at its outset in securing arms, officers or discipline; of the panic of the first Bull Run, or of the inability of the North to improvise even in the second year of the war and in the rich and populous State of Pennsylvania, a force fit to confront the invading forces of Lee. They apparently believe that our civil war has demonstrated that the lessons of history have no application to the United States and that while in other countries, and even in our Revolution, it has been an axiom that hasty levies of patriotic citizens are but armed mobs (as has just been demonstrated in Greece), with us at the present time, they will for some unaccountable reason, be disciplined soldiers.

Without undertaking to discuss this proposition as to ordinary volunteers, it is submitted that the most sanguine believer in the prowess of the American volunteer must concede that an exception must be made in the case of the heavy artillerist, and particularly of the gunner of a heavy gun. It is to urge the procuring and training of such gunners in time of peace that this paper is particularly directed. They at least must be men of special training, a training continued for such a length of time that accurate and rapid action has become mechanical.

What is the problem that such an artillerist will have to solve? His weapon is complicated, much more so than the guns heretofore in use, much more so than a field-gun. While

possessing an immense range and great destructive power, provided it hits the object at which its fire is directed, it needs to be handled with great precision or it will hit nothing, and therefore be useless. Its life is short and the cost of practice with it is so enormous as to be almost prohibitory. Its target will be a moving one, moving too at such a speed that, while four shots are needed to establish the range, four or five shots may be all that it may be possible to fire from the time the target comes within range until it has passed. In addition, the men operating the gun will have to do their work under a heavy fire.

In other words, a modern gunner must be able, while shells are bursting above his head and his comrades are falling around him, to work out a problem like this: "That ship is three miles off, she is approaching at such and such an angle, her speed is fifteen miles an hour, the forward turret is the place to hit, the wind is strong from 9 o'clock, the temperature is 75° and the barometer is 30.06. I must therefore give so many degrees of elevation and allow so many points for windage." Having done this, he must aim his gun with the greatest rapidity and exactness and fire. If he makes a mistake in any of the factors of his equation, or lays the gun so that the variation of the sight is greater than a fiftieth of an inch, his shot is wasted. If he is right in everything, it may disable the ship he fires at, and, by so doing, save the city he is protecting.

Is it not clear that it is idle to expect that satisfactory work of this description can be obtained except from a force which is made up largely from trained men?

Undoubtedly, in case of war, a certain and large proportion of the detachment of each heavy gun may be composed of new enlistments. But the proportion of these cannot safely exceed three-quarters. Certainly all the gunners must be experienced and disciplined at the outset. Anyone who has undertaken to train a team of riflemen, particularly at the longer ranges, knows that special aptitude is required, which is only found among a few, and that to this must be added long practice and intelligence. In the case of an artillerist there is also needed mechanical ability and discipline. I am informed by artillery officers that Lieutenant Carbaugh is unquestionably sound in stating that at least one-half of the present enlisted force of the United

States artillery are not capable of becoming efficient gunners, even when they have had the advantages of the instruction in the artillery school at Fortress Monroe. How then can it be expected that gunners can be obtained from hasty levies of uninstructed volunteers?

It also must be remembered that when we want our artillery we will want it quickly and badly. Steam has bridged both the Atlantic and the Pacific. In modern wars it is a word and a blow, and the blow is frequently a little ahead.

Foreign nations have much larger navies than ours and very much larger armies. They are perfectly aware of the defenseless condition of the country, and if we should become involved with any of them, would strike at once at the cities of our seaboard. There would be no time then to select and instruct the gunners required to man our forts and aim our heavy guns. On the other hand, if we possessed a reasonable force of trained artillerists in our forts, the country could rest behind them in comparative safety while it was raising and organizing its volunteers and strengthening its artillery.

In fact, the possession of such a force would in itself be the greatest conservator of peace, as it would discourage an enterprising foe from thinking of striking us a staggering blow at the outset.

A striking example of the results that may follow if the United States continue to pursue their present policy as to coast defenses is given in Capt. Alfred T. Mahan's account of the battle of Copenhagen, which appeared in the *Century Magazine* for February, 1897.

Denmark had not declared war with England. She had a fleet which England was fearful might be used against her. Nelson with a powerful fleet was therefore sent to take it, on practically no notice. Denmark had neglected her forts and like us had no artillery. No men were braver or more patriotic than her sons and they flew to the forts upon the approach of the English fleet. All the night before the battle the Danes were drilling at their guns; but they learned that gunners cannot be improvised. Their fire was inefficient, they were even exhausted by their efforts in trying to learn the use of their guns. They were driven from their posts by superior fire, and their country in consequence suffered a crushing defeat.

Capt. Mahan writes: "For there had come upon Denmark one of those days of judgment to which nations are liable, who in time of peace neglect to prepare for war; and when her honor demanded or she thought demanded that she should choose resistance rather than submission, there was but little left but to take her beating first and to submit afterwards. Her population responded to the country's call as the old Norse blood might be expected to respond. There was shouting and singing of patriotic songs and volunteering *en masse*, nor was the enthusiasm belied by any failure of heroic performance on the day of battle; but all this did not supply the strength which preparation and training to the latent powers of a country are to the muscles of an athlete. For the most part the seamen were away in merchant vessels * * * but for the defense of Copenhagen it would have mattered less had there been available a body of expert artillerists. * * * The necessary gunners were not forthcoming and the fight was largely fought by men unaccustomed to military exercises, peasants, mechanics and others from all classes of life. It is told that at one gun the charge was put in after the shot and doubtless many such mistakes were made." The Danes "had been hard at work pushing forward on the very eve of battle preparations that should have been completed long before. The raw guns crews were drilling throughout the night. 'We had not' says a Danish author, 'believed Great Britain was in earnest until the fleet actually sailed.' In the city few slept. Most had relatives or friends * * * who were about to fight under the eyes of their fellow citizens and all looked forward to the falling of shells in the town as part of the day's terrors."

What reason is there to believe that if hostilities should suddenly break out between the United States and any modern nation over the Sandwich Islands or any one of the questions that are constantly coming up, a similar attack might not be made upon San Francisco, New York, Boston, and our other coast cities and our country might not suffer a similar calamity?

The official reports show that when the new system of fortifications is completed, 29,000 artillerists will be required to provide one relief for the service of the guns they will contain; while three reliefs are required in war. The present fortifica-

tions around the city of New York alone require 7000 men to man them, and when those now under construction at this port are completed the force will need to be 13,000. The entire artillery force of the United States at the present time numbers about 3890, including ten batteries of light artillery, all of which are equipped. As our system of defenses when completed will, as above stated, contain 2000 guns and mortars, there will not with the present force, be enough artillerists to provide two men to a gun. The whole artillery strength will not provide half enough men to man the present fortifications around New York alone. Moreover if the artillery force should be increased at once to 7500, it is clear that it would not be possible to obtain from that number 4000 good gunners. It needs no argument to show that it is perfectly idle to think of having less than two skilled gunners to a gun to make it any way effective in war. Consequently, an increase in the artillery of 7500 men is the very lowest which this country can get along with.

There has been a good deal said and written in regard to methods by which the necessary artillery forces could be provided from the National Guard of the States, or some other similar organization to be hereafter organized, and as to how these could be so trained in time of peace as to be immediately available in time of war. While some of these plans are sound, I do not think that anything of the kind is at present practicable. What is needed, and needed *now*, and in the very worst way, is a sufficient force of trained gunners. These, as above stated, must necessarily be men who devote their entire time to their duties, and are always in a high state of training and discipline. It is they who will aid in "licking into shape" the additional force of artillerists which will have to be provided when the emergency comes. It would, of course, be the part of wisdom to take some steps to provide this additional force. But our statesmen and people have such curious ideas in regard to military matters, that it will need all the arguments that can be brought forward to get Congress to provide the necessary gunners. To undertake to organize an additional force without increasing the artillery itself, so as to insure a supply of skilled gunners, would be a mistake, in fact, a waste of money. Such a force might be of value to supplement the

Regular artillery. Their training could not possibly be sufficient to enable them to take its place.

Lieutenant Carbaugh has done me the honor to quote my statement that I think that but little aid can be expected from the National Guard of the States in the way of an additional artillery force. That the National Guard organizations of the States, as a rule, have all they can do to learn their business as infantry, or perhaps light artillery, within the time that they are able to spare from business, and that to add to this any considerable amount of heavy artillery duty, even assuming that the States would undertake it (which I very much doubt) would be very apt to make them poorer infantrymen without becoming efficient artillerists. To this opinion I still adhere. Massachusetts has given her State militia an occasional tour of duty in the forts, but I do not think that it can amount to much in the way of making them artillerists. In New York the experiment was tried and abandoned. Still if some heavy guns were erected in the various armories of our sea-board cities, and the services of Regular officers utilized as instructors, a good deal might be taught to the National Guard organizations, so that if they were given a tour of duty at the forts occasionally *with plenty of target practice*, they would learn considerable. But this would not be enough to make them gunners, and it is gunners that are wanted at the present time. If such an organization as the British Volunteer Artillery Association was to be established, with annual prizes and matches, gunners would be developed, but this would take a long time, and I see no sentiment in its favor among the National Guard.

It must also be remembered that the true province of the National Guard is a school for officers, and that in case of war a large proportion of the members of our best organizations would accept commissions in the volunteers, leaving only a small number remaining in the ranks. Also that much of the Guard is stationed inland so far from the forts that it cannot use them as places for instruction even if it was ordered, except at a prohibitory expense and loss of time.

Assuming that the artillery force of the army is increased to 7500 as above suggested, it is almost equally important that

the new men should be of a high grade of intelligence. If the pay is made sufficiently high, and it is given out that they are to be a *corps d'elite*, stationed permanently in good quarters, there would seem to be little difficulty in securing the services of men of the grade of good mechanics, who would soon learn their duties and after having been carefully trained, would be competent to constitute the officers and non-commissioned officers who will mould and discipline the artillery force when expanded to a war footing. Such of these as show themselves to be competent to be gunners should receive extra pay and should be called upon each year to qualify. Those who show no qualifications as artillerists should be transferred to the infantry or be discharged. It would also be wise to have annual competitions among the different organizations in firing, with marksmen's badges, prizes, etc., as has been found so beneficial in infantry firing. It is a matter of congratulation that steps are being taken in this direction. Every endeavor should be made to cultivate not only accuracy of fire but accuracy combined with the greatest possible rapidity. The maxim "that a soldier who cannot shoot is useless" applies tenfold to an artillerist. While as above stated, the cost of practice with the largest pieces is prohibitory, it is a comparatively simple matter to adjust to them auxilliary barrels of small calibre, with which actual firing can be carried on. This has been frequently described in articles in the JOURNAL. Everything that is possible should be done to use the energies and ingenuity of officers and men to secure the training of each garrison in every phase of gunnery in both night and day, fine weather and foul, that they might be called upon to meet in war. The country would then possess, if not all that it needs for its defense, at least a nucleus upon which that defense can be based in time of need, with some hope of success.

While as above stated, I think that it is impracticable at the present time to undertake to supply, from the National Guard of the States, the gunners that are so badly needed for our seacoast defenses, much can be done on the other hand towards strengthening the artillery arm of the army by encouraging the formation in the National Guard of light batteries. There are but ten of these in the army. In case of a war there would be

such a demand for artillerists that their officers and men could probably not be spared from the forts.

Yet Germany and France have each over 2200 guns in the active army and in addition a field reserve of 924 guns in the case of Germany and 1788 in France. Japan landed upon China in about three weeks 210 field-guns (besides 100,000 men thoroughly equipped in the most modern manner).

In my own opinion the wise course for the country to adopt with our batteries in case of war and very largely with the infantry, would be (as I understand General Grant to have advised) to break them all up into details to be assigned to each volunteer organization, so as to give to each a leaven of experienced and disciplined men, which soon renders the whole organization efficient.

But in the meantime the Government should encourage the National Guard to form field batteries.

The service of a light battery is one which they can acquire with much less difficulty than that of heavy artillery. The use of the piece and the theory of the art can be acquired in their armories and they can secure considerable practical experience in short marches, which will not take up time that they cannot spare from their avocations. While of course they cannot be expected to be up to the standard of a Regular battery, particularly as to their horses, experience shows that they can be so taught that it would need them but a short time in the field to do effective work. Their number is now small, because their equipment is expensive; the equipment of a light battery of four guns costing about $11,000. The aid which the general government extends to the militia is absurdly inadequate. Consequently the States as a rule draw it in what they need for their infantry. In fact the cost of a single battery would be more than some of the smaller States would be entitled to draw from the Government for several years. They therefore do not have them. If, however, the Government would adopt the policy of loaning to the States the guns and equipments required for a light battery, whenever such a battery should be organized, charging only for the perishable parts, the number of the latter would be largely increased. I see no reason why such batteries would not be freely formed in the small towns and cities

of the interior, which are too small to support a large military organization, such places as now furnish the "separate companies" of New York State, which have proved so successful. A battery in such places would have much less trouble in securing horses than one in a large city, and its members would know how to drive and care for them. It would be able to have frequent field drills, without taking its members too long from their business, and it could easily find nearby places where it could engage in target practice. The latter should be encouraged as much as possible. To this end the issues of ammunition should be liberal. Prizes for proficiency in shooting should be offered, and everything possible done to secure the development of batteries, which if not up in all the little details of drills would be a dangerous adversary to the enemy against which their guns may be turned. Military tournaments, such as those at Madison Square Garden last winter, should also be encouraged. Such methods beside training the batteries to be effective, would also tend to make the service popular; a matter which is of no small importance in an organization like the National Guard. Such batteries beside their guns should also be provided with rifles, so that they could perform their local duties of preventing riots and otherwise sustaining the local authorities (in cases where their guns could not be used) as if each was an infantry company.

If the establishment of such batteries should be undertaken, it would be good judgment to detail one or more army officers to each State to assist the officers in each battery in learning their duties and training their men. Their services would be valued and appreciated. There is not the slightest fear that it would be considered as a case of "federal interference." The day of that bugaboo is about ended, now that there are Regular officers in all the State National Guard camps and upon most of the staffs of the various governors.

A general invitation should be extended to the officers of the various National Guard batteries to undertake a brief course of practical instruction at the different army posts at which a Regular battery is stationed, they paying for their subsistence. This is done in Canada with good results. I was once staying as a guest in the Citadel at Quebec and found there an officer of a

volunteer battery going through such a course of instruction, which also included the training of his horse. In fact a whole battery might be invited to a post where they could be put through a course of field firing as the Naval Reserves do on our men-of-war.

When Jefferson was President the country had a population of 7,000,000 and it was considered a wise expenditure, even in those economical days, to appropriate $200,000 annually for the support of the militia of the country. At the present time this appropriation is fixed at $400,000, although the population has increased tenfold, and its wealth in a much greater proportion. This appropriation is not paid in money, but is drawn by the States in military stores and camp equipage, which they need for the use of their National Guard much of which can only be obtained from the Government.

The amount which the States are authorized to draw from the Government at the present time, counting the militia at 111,292, is $3.60 a man. This is little more than the cartridges should cost which an infantry man should annually use in the rifle practice. On the other hand, the Fire Department of New York City costs a million and a half dollars a year and that city alone pays annually $6,000,000 in premiums against the risk of fire. The experience of the United States shows that war is fully as likely to come as a great fire in a large city, and that the expenditures which are necessary to reasonably provide a nucleus for national defense are as good economy as the expenditures of the merchant in paying premiums for an insurance against a conflagration.

Ordinary prudence alone dictates that an increased expenditure of at least two millions of dollars per annum should be undertaken by the country for military purposes, which is about the cost of a battle-ship. It would be well spent if one million of it would be devoted to increase the sea-coast artillery, one half million for the benefit of the present U. S. Infantry force, and another half a million for the benefit of the National Guard, especially the field artillery, and supplying it with annual ammunition for actual practice. In fact, the rule should be that where the States provide clothing, armories, pay and food, the Government should provide arms, ammunition and equipage.

Such an expenditure is well within the resources of the country. It is true economy. Not to incur it is to invite disaster and national disgrace. If it is incurred the nation can pursue the even tenor of its way with the knowledge that the vast wealth which is contained in its great sea-board cities is not at the mercy of any one of a dozen foreign nations, far inferior to it in strength, who may choose to suddenly pick a quarrel with it.

Let us remember Copenhagen and increase our artillery to the extent necessary to enable it to care for our armament in time of peace and at least *direct* its working in time of war.

THE TENDENCY OF EVOLUTION IN THE ARMY.

By Major C. A. P. HATFIELD, U. S. Cavalry.

THE law which brought forth earth from chaos, which brought man and all human affairs from the lowest savagery to civilization, necessarily develops an army along with other institutions.

It does not require proof that we are progressing, but if it does, we need only refer to the records of fifty years ago; and those of us who go back in memory twenty or twenty-five years, need only bear in mind the army of those days to note the development which has occurred since. Hence, it is not my wish to demonstrate that we are improving; but rather, that in advancing, we do not move uniformly; that all parts of our machine are not kept in equally good running order.

When we discover there is room for improvement in some direction, at some particular point, we immediately devote ourselves to this subject to the exclusion of other things of equal importance: as the saying is, we run it into the ground. Having fairly decided on the *hobby*, we stick to it for a while with an intensity which would class an individual as eccentric, a crank, a man of unbalanced mind. For this reason, if a close examination were made at any time, it would be found that whilst in some particulars we are over-trained, in others we are far below the mark.

For first illustration I will take the subject of target practice. I will begin with the period immediately succeeding the Civil War. At this time many veterans were in the ranks; men accustomed to battle, expert in the use of arms, and, in general, qualified for the hard service still to be demanded of them on the frontier, where they were sent shortly to garrison the stations abandoned during the Civil War. It was not deemed necessary that the men should be practiced in the use of the rifle. The army had just finished most gloriously a great war, where the men had proved themselves good shots, and why should they not continue to be so for a long time? Probably it was thought a waste of time or a useless extravagance to fire away ammunition at a target; or it may have been overlooked.

Whatever the reason, the fact remains that for at least ten years after the war there was little or no small-arms target practice in the army.

There was no hobby during this period, nothing to disturb our repose but an occasional Indian campaign. But it happened in the centennial year that a team of riflemen came over from England to compete at rifle firing with a team of New York Militia at Creedmoor. I believe this was the event which suggested the propriety, or rather necessity, of taking up the subject in the army. Thus we commenced target practice in 1877 and soon became totally absorbed. We were thoroughly engaged in a few years, when everything else went into the shade. It was a great thing; the only wonder was, how had we gotten on so far without it. Morning, noon and night, from sunrise till sunset, nothing but the popping of the rifle, year in, year out.

There was no inclination for anything else since it was about the only avenue that led to medals, honors and distinction. On account of the system of records and scoring there was developed presently an unhealthy competition. We heard of trials by court-martial, and the eagerness to shoot was so great that we sometimes heard of markers and others being shot at target practice.

In the cavalry, all the best shots, those men who could push up the score, were allowed to fire with the infantry rifle. I frequently heard cavalry officers suggest the advisability of

arming the cavalry with the long gun. The band, the man sick in hospital, the prisoner from the guard-house, were all taken to the range to make a score.

The fire burned furiously, but waned after a few years and left with us a sensible, practical system of small-arms firing regulations.

As a result of the craze which had monopolized our interest for a number of years, it was finally seen that, admitting the army had become more expert in the use of the rifle than any other in existence, we had materially fallen away in other respects.

In all training outside of rifle firing we were at a standstill, and discipline had deteriorated as evidenced by the vast number of desertions and court-martial cases. Something must be done and done at once to make the enlisted man more contented, to stop desertion. Many suggestions were made. The military journals of the period contained articles on the all important question—how to stop desertion.

It was thought that officers who had come from the ranks must necessarily know more about desertion than any one else, and opinions from them were much in demand. Finally, something suggested the "canteen" as a panacea: it was a happy thought, it sounded well and pretty soon became the hobby. It had been in operation in a conservative way for many years in the English army and had worked well, but never became the most prominent feature of garrison. However, when once thoroughly interested, we never do things by halves, and the canteen, which shortly took on the more soothing and respectable name "Post Exchange," soon became a matter of profound study. The growth of the oak from the lowly acorn is scarcely more amazing than the rise of the post exchange from its humble beginning. From a modest resort for men seeking harmless recreation, or a glass of beer to keep them at home from the whiskey dives in the vicinity, it has become a business establishment, in some cases, the envy of all the merchants in the neighborhood. It materially adds to the maintenance of the regimental bands, it purchases appliances for gymnasiums, athletics and calisthenics, adds luxuries to the company mess, and swells the company fund until it becomes a problem to

know what to do with it. Is there a limit to the growth of the post exchange? Starting with nothing in 1889, it declared dividends in 1896, probably, of several hundred thousand dollars.

At Fort Grant, Arizona, there are four troops of cavalry, two companies of infantry and a regimental band, and the following is a report of the operations of the exchange for 1896, viz.:

Received from sale of merchandise, .	$17,599.72
Received from recreation room, . .	41,00
Received from other sources, . .	17,048.49
EXPENDED.	
Paid to band fund, ...	$ 328.66
Paid to retiring troops, ...	2,266.98
Paid in dividends to troops, . . .	6,442.77

Received on deposit $39,343.98, and paid $37,737.60 under the banking system of the exchange.

At some of the other posts we find the exchange almost as profitable as it is at Fort Grant, but in a number of instances it still remains a small affair. This difference in prosperity is due to several causes, principally to locality. For instance, in the case of Fort Grant, the post is twenty-two miles from the nearest town, and the exchange having all the trade of a large garrison—and possibly some from the outside—has a vigorous growth. On the contrary, a small garrison near a large town or city does barely more than exist. And again, occasionally, the commanding officer steps in and prohibits the enlargement of the stock. Whatever the cause, a difference exists, and the company fund, which varies directly in proportion to the prosperity of the exchange, presents similar inequalities. Since the organizations at the posts are the owners of the exchange, what will be the result when it comes to a change of station? Could a worse fate befall a troop whose fund is two hundred dollars than being assigned to a garrison with a rich exchange? In such cases which might occur, the new arrival would be compelled to pay in the neighborhood of twelve hundred dollars for the privilege of entering the exchange and sharing its dividends, or be excluded altogether, possibly for a year. Can such an arrangement as this, which might happen at any time, be in the

interests of contentment or discipline? Would the men of the new troop living on the ration as in the old time, be satisfied to see their comrades of the next troop living in luxury as members of the post exchange? Consequently, the changing of station will be a most serious matter.

I have always thought the company fund should be kept down to two hundred dollars, since this sum would be quite adequate to meet all emergencies. Moreover, I believe it would give more satisfaction and better results, if all money in excess of a moderate sum were expended for the benefit of the men present when the fund is made, rather than hoarding it for those to come hereafter.

The time will come when this important matter can no longer be left to the caprice or money-making capacity of the individual exchange officer. It will require regulating and bringing down from its lofty and erratic flight to a business condition suited to a military state.

The subsistence department should be required to keep on hand a larger assortment of merchandise to meet the wants of the soldier at isolated stations like Fort Grant and thus give the exchange an opportunity of returning to a state of simplicity.

But still any of us who can recollect the day of the post trader, when the soldier paid his twenty-five cents for a glass of villainous whiskey, and when the fare of his mess was principally hash and beans, must admit we have taken a long stride in the right direction. But why—when we have a good thing—as we certainly have in the post exchange—must the tendency always be to continue the development until our favorite grows beyond recognition? A short time after the advent of the post exchange it was decided that the army was sadly in need of mental training; we required theoretical instruction in military science, we were not up with the times.

Nothing had been done systematically by us in this respect, whilst the European armies had long been perfecting their own systems of education for officers. To meet our necessities the order was issued in 1892 for establishing the lyceum or post school for officers with the essay an important feature of the system. It was rather hard on a war veteran of thirty years'

service to be called on unexpectedly to prepare an essay on a military subject, when probably he had never before attempted more than a letter; but the order was inexorable and we all began to write.

Necessarily the majority of the essays were neither contributions to literature nor to military science, but the idea, particularly the essay, appealed strongly to the fancy of the younger officers. The seed fell in good soil and presently brought forth a larger number of military writers than were ever known in an army before. Our military writers, particularly the young men, are extremely ambitious—and although many of the articles are mostly compilations—they are progressive, which goes to show we are not neglecting our books, as anticipated in the order.

This movement for a higher education is working admirably. At present it is the only road to distinction, preferment and promotion. Better material could not be found anywhere, and it may be truthfully said that before many years we will have the most highly educated and thoroughly trained (theoretically) army in existence. The subject of education is peculiarly fascinating to an educated people, and the lyceum with the essay has evidently come to stay. Now since we know our tendency to run to extremes, it is worth while to find out whether—from the manner in which we are following the subject—it is going to work entirely for our good.

Judging from the past, it is only reasonable to suppose that in our present ardent pursuit of education we are necessarily leaving something behind. Here I will call to my aid some modern English history and see what lesson we can learn.

At the close of the Napoleonic wars the English army was in a state of great efficiency; never before or since in its history do we find the same well trained officers and disciplined soldiers. It was thoroughly inured to the hardships of campaign and was specially well qualified for the practical operations of war. Has not the marching and management of Crawfurd's Division in the Peninsular been our text to the present day? This army was superior by long odds to anything on the continent of Europe; it was practical, containing no element of theory. For the young officer who joined after the war, the expression of an opinion by a hero of Waterloo was all sufficient. It would have

been disloyal to have questioned it, to doubt the word of the man who knew so well how to fight the French.

Although at this time a number of brilliant military writers were coming to notice in the continental armies, no one in the English army, except on rare occasions, had the inclination, or even the moral courage to make public his ideas (if he had any) on military progress. In fact, in some of the regiments the discussion of military subjects, or of anything relating to the profession of arms, was by tacit agreement tabooed. When in a few years, however, the veterans of the Peninsular began to disappear, to become in the minority; also, probably under the influence of an occasional bright military essay from the continent that would find its way into the journals of the day, there came about a gradual change of feeling. The young men began to learn that the old fellows did not know so much after all, and not fearing any longer adverse criticism in the mess, began to bring out their books and write themselves.

This effort to shake off old traditions and start in for modern improvement, met with every encouragement from the War Department. By the year 1845 the forces which had been at work for some years had effected a complete change, and from this time on, the army was entirely under the influence of theory and imagination. For thirty-five years the nation had been at peace, except an occasional difficulty in the colonies, which had no bearing on the situation whatever; and this added to the fact that it was not considered necessary to engage in field manœuvres, or in any operations in imitation of war, naturally produced a theoretical army, exactly the opposite to that of 1815. The government was satisfied, and the people, judging from the essays for a dozen years back on every military topic, from strategy to the proper shape of a soldier's boot, from the quality of the ration to grand tactics, naturally supposed the army was in superb condition. When the prize-fighter or game-cock has been trained to the proper pitch, he looks around for a fight and usually finds it, and we meet with this peculiarity also in armies.

At any rate the English army was supposed to be in splendid condition: it knew more about the art of war, at least, could write more about it than at any time before, and naturally we soon see it embarking for the Crimea.

It is unnecessary to go into any description of that war; besides it is a painful subject. To refer to the utter collapse in every department, the complete demoralization in every branch of the service, to men starving and dying for want of subsistence and care—when tons of provisions and medical stores were only a few miles away—is cruel. Theory had finally produced an army, which if called on to march one hundred miles in the ordinary manner of war, would lose more men than in a great battle; an army which had taken the art of war back to the time of the early Crusades.

We admit that nothing is more essential to development and healthy progress in the army than study on the part of its officers; deep patient research into history and into every subject bearing on our profession; and at present we are thus engaged in storing our minds with military ideas to be placed at the disposal of the Government on some future occasion. But in consideration of this educational work, what are we neglecting? Why something—when an army is concerned—of equal importance with education itself—practical work.

Wherein lies the merit of learning and reciting, year after year, on infantry, cavalry and artillery "in attack and defense" and other theories of the art of war, when a larger portion of the non-commissioned officers and half of the officers in the army have no idea what appearance three hundred men in marching, fighting, or in any order, would make at one thousand yards? Except in a few favored instances—extremely rare—it can be said we are having no practical instruction in field manœuvres, in the grand principles of the art of war.

And is it not possible some day—when we are called on to draw from our vast store of ideas—to put them to practical test—that we may find the ideas congested or so confused as to be of no use whatever? It would be as reasonable to expect to become a surgeon by learning the manual of surgery as to expect our officers to become qualified for the simplest operations of war by study alone.

Since we have nearly one hundred officers teaching military science in the State schools, would it not be well to make an annual appropriation and require the militia to cöoperate with the Regular troops in field manœuvres, in the practical work of

war, on a scale commensurate with our wealth, resources and importance?

We are gradually becoming more involved in the affairs of other nations. Depending on arbitration and coast defenses, is it not possible to put off our preparation too long?

War can be declared, begun and finished to-day in less time than was required to place our unwieldy armies in their first positions in 1861.

THE BICYCLE IN MILITARY USE.

By First Lieut. E. P. LAWTON, 19th U. S. Infantry.

THE bicycle, from an obscure instrument of a few years ago possessed only by the rare adepts in its use, has become to-day the almost universal accessory of every home, of rich and poor alike.

Probably nothing in recent times has been so astonishing as the sudden, rapid strides which this new means of locomotion has made into general public favor.

Where but a few years ago a cyclist was a rare and rather startling sight the streets and highways to-day are thronged with them.

Its immense popularity, combining as it does healthy sport and pleasurable exercise with frequent utility, its very general endorsement by the captious censors of ethics and morals the world over and the perfection it has attained as an instrument place the use of the bicycle beyond the category of mere fads and assure for it a permanent place in the economic life of the people.

So long as the bicycle continued in an experimental stage, that is to say so long as it continued an imperfect instrument of its kind, it should not and did not receive any serious consideration from military authorities.

It soon became evident, however, that manufacturers were turning out machines which might meet the exacting requirements of military service.

The enormous demand which the increasing popularity of

the bicycle was occasioning had resulted in the establishment of innumerable plants, consequent competition, and acute rivalry, under the influence of which every detail of the machine was attaining the highest degree of perfection, resulting finally in the bicycle of to-day, a remarkable product of the mechanic art.

When it became evident that there was thus being evolved from a frail, uncertain instrument a strong, enduring, practical machine experiments began on its use for military purposes.

Before proceeding to discuss the progress of these experiments and their results it will be as well to consider for a moment the instrument itself, its history and its performances.

HISTORY.

The origin of the bicycle and its predecessor, the velocipede, dates back to the year 1790, when one Sirvac, a Frenchman, invented an apparatus consisting of a wooden horse mounted on two wheels in tandem.

The machine was straddled by its rider and propelled by alternate pushes of the feet on the ground. Notwithstanding its crudity it is said that long distances were covered with it at quite a rapid speed. It was guided by blows on the head of the horse.

The following is a summary of the more important of the numerous modifications which this humble original has undergone in the course of its transition to the present bicycle:

1818—Baron Drais of Baden placed the front wheel on a vertical pivot and added a lever to guide with.

The same year an Englishman substituted an iron frame for the wooden horse.

1855—Michaux, a Frenchman and locksmith, patented and executed pedals which he placed on the front wheel. This resulted in the first veritable velocipede and the machine, which went by his name, was in use for a long time. It carried a T-shaped bar the horizontal branches of which served as handles. Its weight was 88 pounds.

1869—Surnay, a Frenchman, patented ball bearings, from an old idea. This resulted in wonderfully increased speed and the first velocipede race took place about this time between Paris and Rouen, a speed of nine miles an hour being maintained.

1878—Tangent spokes were first seen at the exposition of this year.

1880—The first bicycle in any way resembling the one of to-day was made in this year by the Tangent & Coventry Company, of England. Up to this time the front wheel, used as the motor, had been made very large in diameter, so large in fact as to require a ladder to get into the saddle which was placed directly over it, while the rear wheel was made correspondingly small. In the new bicycle the rear wheel became the motor, but the company made the mistake of continuing its small dimensions.

1886—In this year appeared the English bicycle known as the Pioneer. Its mechanism was practically the same as that of the bicycle of to-day. The rear wheel, now being the motor, was made larger, the seat was placed nearly midway between the wheels, and the chain and sprockets used. It had a wonderful success, for it solved the problem of combined safety and celerity.

All bicycles were now modelled after this one, and there followed rapidly the modifications and improvements seen to-day on all first-class machines, viz.,—ball bearings for pedals and handle bar, frame instead of upright body, spring saddles, hollow rubber and then hollow rubber pneumatic tires.

This latter and most important invention was due to a man named Dunlop, of Belfast, Ireland. He was a horse doctor and, out of his bandages, in trying to render his child's wheel easier riding, he succeeded in making the first pneumatic tire.

To this invention, which reduced the jolting of the machine to a minimum, is largely due the immense popularity and widespread use of the bicycle.

The pneumatic tire has, however, well-known structural defects to overcome which strenuous efforts are now making. These efforts will undoubtedly result successfully, if they have not already done so, and the use of the bicycle will then become more than ever universal in its applications.

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All the best known wheels are good, many of them apparently perfect in every detail.

Some of the performances in speed and endurance accomplished on these machines by expert riders are remarkable and deserve consideration from a military standpoint as showing the capabilities of both wheel and rider under extreme conditions.

As some indication of the advantages of bicycling over pedestrianism is cited the fact that for each turn of the pedals an advance is made of about sixteen feet on a bicycle, while for each double step in walking the gain is only about five feet and the physical effort greater.

On an ordinary road with a bicycle, 7 to 9 miles an hour can be made easily without training, 10 to 12 with previous training; 48 to 60 per day without training, 125 to 155 with training.

On the track 586 miles have been made in twenty-four hours. Hale, an Irishman, recently covered on the track in New York 1910 miles in one hundred and forty-two hours.

Among other performances of more practical application may be mentioned those of the French rider Terront, who made the run from Paris to Brest, 745 miles, in seventy-two hours, maintaining over 10 miles an hour, and later, without stop or accident of any kind, the journey from St. Petersburg to Paris, 3000 miles, in fourteen days, seven hours, an average of 9 miles an hour.

Stocks, an Englishman, has made 28 miles in one hour. Zimmerman maintained for some minutes a speed of 36 miles an hour.

Anderson, of St. Louis, has covered the paced mile in a fraction over a minute.

The fastest horse, Nancy Hanks, required 2 min. 5 sec. for the mile and in fact it is easily seen that these performances far surpass anything that the horse can do.

French scientists have interested themselves in the wonderful development of physical strength and endurance displayed by bicyclists in some of these contests and have made calculations as to the equivalent mechanical force required to accomplish the more remarkable of the feats.

Some of the results are interesting, but one, will be cited here.

They took the case of Terront in a contest where he made 1000 kilometres in 41 hrs. 58 min. 52 sec.

Their calculations showed that the mechanical equivalent of the physical effort exerted here by this man, or the work performed, was 5,500,000 foot-pounds, or, taking his weight at 145 lbs., sufficient to make six hundred continuous ascents of the tower of Notre Dame (223 ft.) or seven continuous ascents of Mont Blanc (15,781 ft.).

It is of course only by the most severe and assiduous training that these performances are rendered possible.

THE MILITARY BICYCLIST.

It is not surprising that wide-awake military men should have been attracted in a professional way to an instrument which enabled man to annihilate distance as this one does.

The strategical considerations given rise to by the advent of the railroad were of too recent occurrence and too pronounced in their results to allow of indifference toward this new means of locomotion.

As early as 1878 consideration was being given to the advantages possessed by the bicycle for rendering certain service in the army, though no idea was then entertained of the possibility of its ever playing the part now contemplated for it in military operations.

The first advocates of its use were moreover frowned down upon and even ridiculed by that ultra-conservative element, by no means scarce in army circles, which sees or would wish to see all the virtues in an obsolete, enervating routine wherein, the advocacy of anything like an innovation, however promising in results, is a rank heresy which cannot be too severely dealt with. It was, then, only by the greatest persistency on the part of the advocates of its use for military purposes that a trial was obtained for the bicycle.

However, this trial, once authorized and carried out, met with such marked success and proved so conclusively the utility of the bicycle that it was speedily followed by other trials which resulted in the general recognition and adoption throughout Europe of the bicyclist as a part of the military establishment, governed by regulations as to recruitment, pay, equipment, etc.

Subsequently his rôle has developed and very extended use is now being made of this new factor of a modern army.

The present and prospective use of the military bicyclist may be considered under the two heads. I. Staff, Courier, and Orderly Service. II. Service as Combatants.

I. STAFF, COURIER, AND ORDERLY SERVICE.

The extraordinary speed of the bicyclist and his preparedness for service at a moment's notice first attracted attention to his fitness for duty of this character and in fact the first use made of him in European armies was as an orderly.

Germany as early as 1880 supplied all her large fortified places with wheelmen for this duty.

These orderlies were then taken along in the field during the manœuvres and did such excellent service that the use of cyclists for staff duties pertaining to the delivery of despatches and messages, also for the procuring of certain kinds of information soon became general in all the continental armies, two or more skilled cyclists being supplied for this purpose to each regiment of troops and a certain number to each general headquarters.

The uses to which these men were put may be considered under the headings:—Day Service, Night Service, On the March, In Camp.

DAY SERVICE.

On the March.—At assembly for marching the bicyclists placed themselves near the commander and remained within call throughout the march except when sent away on duty. When the gait was slow they dismounted and led the bicycle.

Service during the march consisted in the carrying of despatches and verbal messages to commands in advance or rear, sub-commanders, surgeons, quartermasters, etc., the obtaining of sudden information desired on the route, and, in fact, all those comings and goings the necessity for which invariably arises on the march and for which they soon proved themselves indispensable.

In Camp.—The first thing on arrival the bicyclist was required to put his wheel in good condition. He then proceeded to familiarize himself with the location of different headquarters and the best routes to them, also as far as possible the locations of the more prominent officers to whom communications might be sent.

One bicyclist was kept constantly on duty at the guard tent for instant service.

NIGHT SERVICE.

Night service, conferred by the bicyclist courier, has proven even more popular than day service.

During recent manœuvres important orders and messages were thus despatched at all hours of the night in the security of darkness and swiftly and silently conveyed to desired points with the greatest precision.

To such an extent was this service carried that complaints of loss of sleep on the part of these men became general.

Carefully drawn regulations cover this courier service of bicyclists in European armies. They require a moderate speed to be maintained unless the order itself prescribes extraordinary quickness of delivery. Headings for rate of speed and time and place of departure and arrival are required to be placed on each order and must be filled out and signed by an officer. Special cautions are given for night service on account of the danger of losing important despatches through accident to the machine.

During combat bicyclist couriers are required to keep in rear with the reserve.

II. SERVICE AS COMBATANTS.

While the advantages of bicyclists for courier service have long been recognized and general use has been made of them in this way, the possibility of making effective combatants of them has but recently been debated and is now being given thorough trial, and, it may be said, with marked success.

The English seem to have taken the lead in advocating and putting in practice this use of bicyclists, for they have now effective combatant bicycle organizations.

Of course the serious, and, in fact, only objection which has been raised and maintained against the use of bicycle combatants has been the alleged fact that a force mounted on wheels must always be seriously handicapped in its movements by the nature or condition of the terrain or roadbed and may at any moment be rendered useless by change of wind and weather.

While this objection held good some years ago it has been clearly demonstrated that it does not now.

The perfecting of the bicycle as a means of locomotion has

made it capable of travelling, and travelling rapidly, under practically all conditions of roadbed, wind and weather.

Many experiments have been made in military circles to demonstrate this.

Probably the most thorough and practical were those conducted under the auspices of a Paris newspaper in 1891.

They were made in December and, it is said, under the most trying conditions, with wind, rain, snow, and fog. They consisted :—

1. Of a competition for staff and courier service. Prizes to be awarded only to competitors who should cover at least 75 miles in seven hours carrying an order from one point to another, itinerary unknown in advance.

2. Of a competition for reconnaissance service. Prizes to be awarded only to competitors who should cover 50 miles and make four correct written and topographical reports of the country passed over, all in seven hours.

These experiments proved the capabilities of the wheel under the most adverse circumstances. Twenty-five competitors were successful in the first test and sixty-five in the second.

This and other experiments caused the extension of the rôle of the bicyclist to reconnaissance, patrol, and other similar service.

He was also made use of in advance and rear guards as connecting files, thus doing away with signals.

All bicyclists are carefully instructed in topography and general reconnaissance duties.

They were armed and equipped as foot soldiers so as to take their place in ranks should anything happen to the wheel.

Most excellent service has been performed by these bicyclists in the European manœuvres of recent years, nevertheless an objection continued to be urged against them, viz.,—that they were still deficient in mobility, that, unlike the horse, they could not jump ditch, hedge, or wall and a more serious obstacle would paralyze all their efforts.

To remedy this and make the bicyclist, like the foot soldier, absolutely independent of terrain the folding bicycle was devised.

There are several models of folding machines to-day but

probably the best known and the one that combines in the highest degree all of the qualifications for a military wheel is the French folding bicycle known as the Gérard.

The most painstaking care has been used in the plan and construction of this wheel.

Tests have shown it to be equally as rigid and strong as the non-folding machine.

It has demonstrated its fleetness by several successful races against ordinary wheels.

It is light and arranged to be carried on the back with the least inconvenience to the bearer.

Since the patenting of the folding bicycle greater activity has been shown among foreign nations in the matter of the establishment of a large fighting force of bicyclists.

Experiments with companies mounted on the folding bicycle have shown them capable of passing anywhere and of rendering most efficient service.

When an obstacle is reached or fighting is to be done they are dismounted and the wheel is quickly folded and passed to the back. An efficient combatant force of footmen may thus be lined up, always fresh and ready for any work, even after the accomplishment of a march which would prove either impossible or utterly exhaustive of either infantry or cavalry.

It may readily be seen what an effective weapon such a force as this would prove in the hands of an able general.

The following is a summary of the services for which bicycle combatants are eminently fitted and for which they will undoubtedly be put to use in future wars:

1. As Partisans.—To scout and reconnoitre, to deceive the enemy, worry him about his communications, intercept his couriers, baggage train, or ammunition carts, carry off his outposts, and in general for all service requiring quick and audacious action, including the destruction of railroads, telegraph, bridges, etc., that partisan service initiated in this country during the late war as the peculiar work of raiders and for which European nations have been preparing special corps.

2. As Reconnoitring Patrols.—To push rapidly and silently into the enemy's lines and return with valuable information.

For this service bicyclists would seem to be especially

adapted. By coiling telegraph wire on the machine continuous communication can be kept up with headquarters and the information acquired thus instantly transmitted.

3. As Supports to Cavalry.—Probably no greater use will be made of bicyclists in future wars than for this service, where they would seem to fill a long felt want.

The urgent need of support for cavalry when acting alone in such service as reconnoitring, turning movements on the enemy's flank or rear, seizing a battery, etc., and the best means of furnishing it have long been discussed in Europe, where our plan of dismounting cavalry and fighting on foot, has not yet been universally adopted, and provision has been made in some of the armies for transporting infantry in wagons for this purpose.

Now, however, it is thought that bicyclists will wholly replace infantry for such duty with cavalry, possessing as they do the mobility of the latter with the resisting power of the former.

The French military authorities have just asked for twenty-five companies of bicyclists of 200 men each for this intermediate service between infantry and cavalry.

The above are the principal uses made of bicyclists to-day, or those most advocated and predicted for them.

The development of their rôle in the past leads naturally to the conviction that this rôle will be much further extended in the future, and it is not beyond the bounds of probability that we may yet see armies on wheels.

THE BICYCLE IN OUR SERVICE.

It remains now to say a few words about military bicycle service in this country.

While we are to-day probably second to no other nation as regards the widespread use of the wheel among the people at large, and the performances of our civilian wheelmen are among the most noteworthy, little or no progress has been made in military bicycling.

The National Guard of several of the States has organized what are termed bicycle corps, and General Ordway, of the District of Columbia militia, has compiled a rather elaborate set of regulations for bicycle drill, but these efforts seem to have

wholly in view street and other parade performances and are of little practical utility.

Some tests of courier service between our large cities have been very successfully carried out, and have demonstrated the practicability of such service in this country of bad roads.

In the Regular army the bicycle has not yet been recognized officially, though it has found favor with the Commanding General, and recommendations for its introduction into the service have been made to Congress.

Nevertheless, probably the only practical tests of its use for military purposes have been made by Regular officers and are of importance, though limited in their scope, because of differences in terrain, climate, road-bed, etc., which render the elaborate tests and experiments carried on in Europe less applicable here.

There have been several bicycle test rides conducted by army officers, but it is unnecessary to speak of more than one of them, as in each case the same object seems to have been in view, viz., to demonstrate the practicability of the bicycle for military courier service, and all have, I think, given favorable results.

I will briefly refer to the trip made by Captain Abercrombie, of the Second Infantry, about a year ago, as in this case chance conditions seem to have particularly favored the thoroughness of the test made.

This officer took in hand and thoroughly trained three enlisted men, the training continuing for some six weeks preceding the time fixed for the actual test.

This training, he says, consisted principally in daily trips on the wheel, gradually increasing in length, each followed by the thorough rubbing down of the body with equal parts of alcohol and witch hazel.

The test commenced on June 10 and consisted of a run from Omaha, Neb., to Chicago, Ill., and return.

It had rained about every day from the middle of May to the time of departure, and the country passed over was found to be almost flooded. Where there was no water the mud was often knee deep.

The load carried on the wheels consisted of a blanket, half

shelter tent, change of underclothing, revolver and ammunition, one spare chain, two pedals, two tires, two tubes of cement, and a few bolts. The total weight, including the bicycle, was 50 pounds.

The trip was made without recourse to walking, the party sometimes taking to the railroad ties and wheeling across railroad bridges to avoid frequent impassable portions of the road.

Considering the load propelled by these men over country roads in such condition the following itinerary of the trip shows remarkable endurance on the part of the men and wonderful strength in the wheels which carried them without accident:

Journey to Chicago, 588 miles, made in seven days. Average per day, 84 miles. Average per day on return trip, 93 miles. Total distance travelled, 1142 miles. Total number of days of actual travel, 13. Average run per day for the round trip, 88.

These voluntary efforts of officers to test the bicycle and experiment on its use for our service should be encouraged and seconded by the authorities in every possible way, as they prepare the road for quick and effective establishment of the bicycle service as soon as authorized.

More extended experiments are still needed to test the wheel in this country for other than mere courier service.

It would seem to the writer that though an appropriation by Congress for the purchase of bicycles is a desiratum, it is not necessarily an absolute essential for the establishment of cyclist courier service in the army.

Proper advertisement and inducements offered ought to secure, in what is rapidly becoming a nation on wheels, bicyclist recruits accompanied by their machines.

They could be enlisted to the number of four or five to a regiment, with the understanding that they will be paid a per diem for the machine and that the Government will keep it in repair.

We have a precedent for this in the enlistment of Indian scouts, who are paid fifty cents a day for their ponies, the Government also providing forage.

Whatever be the method adopted for obtaining bicyclists for the army, great care should be exercised in the selection of the personnel and in their proper training.

The mental and physical standard should be higher than that for the ordinary private in the line.

The training should be continuous and relate mainly, if not solely, to the special service which they will be called upon to perform. While professional bicyclists, so-called scorchers, are not needed or desired for the military service, thorough knowledge of the machine and all its parts and skillful use of it should be inculcated.

Upon proper organization, recruitment, and instruction, now that a suitable military instrument has been found, alone depends whether bicyclists shall prove a positive incubus or an invaluable adjunct to our present organization, and too much care cannot be exercised in initiating this novel service.

THE FIGHTING UNIT IN COAST DEFENSE AND ITS BEARING ON ORGANIZATION AND INSTRUCTION.

By First Lieut. E. M. WEAVER, 2d U. S. Artillery.

A LACK of definite conceptions exists throughout the service, apparently, in regard to the elements that go to make up a complete artillery defense at any one point of the coast. It seems to have been the idea that if the Ordnance Department makes the guns and the Engineer Corps builds the emplacements, the bringing of these two elements together practically accomplishes the defense of the coast. It will be the aim of this paper to present in a brief manner some of the purely artillery questions which must be considered after all of the ordnance and engineer work has been completed—after the guns have been mounted on their platforms and turned over to the artillery for the uses for which they were designed.

For purposes of illustration, the paper will first take up a brief study of the application of the elements of a complete defense to a particular point of our coast line. The point selected is the south-east extremity of the Nahant peninsula, which projects from the Massachusetts coast-line about ten miles north-east of Boston and directly south of the city of Lynn. This

point of land, together with a group of rocks about 6000 yards south-east of it form the entrance to Broad Sound.* (See Fig. 1.)

FIG. I.

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*It was pointed out in a previous paper, that the line of shore defense, as now planned for Boston Harbor, which does not include a gun defense at Nahant, will not protect the harbor and city from bombardment from Broad Sound.

It was, however, shown, at the same time, that if the line of defense were pushed out farther toward the sea, to include emplacements on Nahant, The Graves, Green Island, Outer Brewster Island, and Point Allerton, it would be possible to bring all navigable water-areas that are within bombarding range of the city and harbor, under a thoroughly effective artillery fire.

This present paper, following the conclusions of the former paper, assumes Nahant as a point to be fortified.

A contour map of the locality is given in Figure 2.

Referring to Figure 1, it will be observed that Boston and its suburbs, and President Roads (the anchorage of the harbor) are within bombarding range of any point in Broad Sound.*

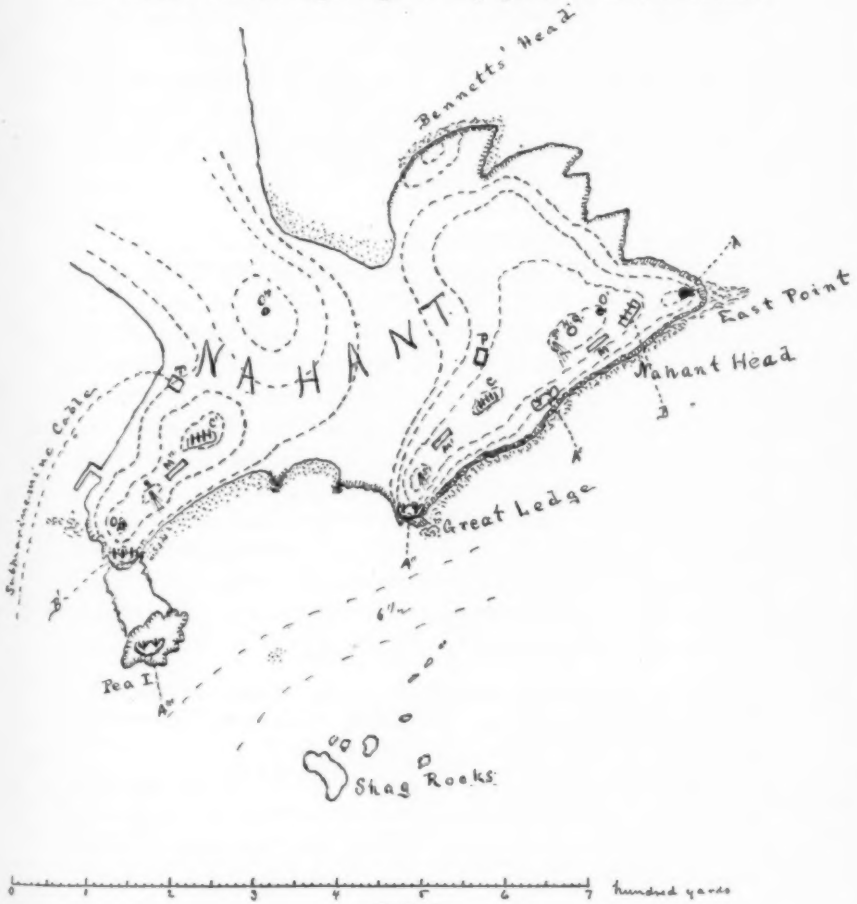


FIG. 2.

* The new mounts for the 9.2-in. and 10-in. guns on the *Barfleur*, *Centurion* and *Renown* admit of an elevation of 40° (see p. 84 U. S. Naval Intelligence Annual No. XIII). In the firing trials of the *Renown*, in the spring of 1896, the 10-in. barbette guns were fired simultaneously with full charges at 35° elevation without any trace of injury to the ship or mounts. This means a bombarding range of 12 miles.

But if the line of defense advocated in the first paper be fortified, the whole of the Sound will be untenable to hostile ships.

While the number and calibre of the guns required for each of these points would probably be different, the methods of using the guns and their accessories, at each point, and at all other points of defense along the coast, would be essentially the same. Therefore what follows may be considered as generally applicable in the treatment of other examples than the one here assumed.

In every modernly armed and equipped fortress * the following divisions of work must be considered :

1. The service of the guns.
2. The service of range and position-finders.
3. The service of the electric lines and appliances.
4. The service of submarine mines.

These may be taken as constituting the fundamental divisions of work for all fortresses; each must have its own personnel, and, in action, all must be worked harmoniously together under the direction of the fortress commander. So distinctly do these "services" differentiate themselves that they naturally become the first subunits for drill, instruction, and command, within the limits of the fortress. They will be called "Divisions" in this paper, and each will be considered the normal command of a captain, with certain modifications, as explained below. These Divisions may now be separately considered.

THE GUN-SERVICE DIVISION.

The consideration of this Division in connection with the defense of Nahant, requires, in the first place, that the number and calibre of guns necessary be determined.

The number and calibre of guns required for an adequate defense of this locality will depend upon the kind and number of war-ships to the attack of which it may be exposed. Since Broad Sound will admit the largest ships, we must be prepared to meet the attack of the most powerful guns, and our own guns must be able to perforate the thickest armor carried on the sides of war-ships. As Broad Sound is large enough to allow a whole

* The word "fortress" in this paper will for convenience be used to denote all the gun groups and accessories connected with the defense of one point of a line which are operated together as a unit under one commanding officer.

fleet to manœuvre in it, we must also provide a numerous armament.*

The calibres must be adapted to the attack of both heavy and light armor; also of unarmored parts, and, in addition, there must be the small-arm fire of machine-guns to attack the personnel of ships exposed on deck and aloft. There will be required, therefore, our heaviest 16-inch, 12-inch, and 10-inch guns for the attack on the thick armor along the water-line and on the turrets; rapid-fire guns for the attack of unarmored parts, and machine-guns to sweep the decks and the upper works.

The number of guns should, at least, be equal to the armament of two first-class battle-ships, say, as a fair average—

Four 16-inch guns.
Two 12-inch guns.
Two 10-inch guns
Six 6-inch rapid-fire guns.
Eight 4-inch rapid-fire guns.
Twelve machine-guns.

It is desirable to place the heavy armor-piercing guns as far forward as possible, and to mount them on low sites. As far forward, because the controlling factor in their fire is *striking energy*, and every foot gained in the direction of the target has a direct effect on the armor piercing power of the guns. On low sites, because it is desirable that the fire should be as little

*Referring to Figure 2, attention is invited to the topography of the area to be fortified. From Bennett's Head around to Great Ledge, the shore is bold, rising abruptly from the water to a height of from 10 to 20 feet. From East Point to Great Ledge the water is turbulent and filled with jutting rocks making it very dangerous if not impossible to land, even from small boats. From Great Ledge to Pea Island Point the shore is lower and beach-like. At Pea Island it is again bold and rocky. Pea Island is connected with the point back of it by a low strip of land which is at times covered with water. A group of rocks, known as Shag Rocks, lies about 300 yards off the shore, directly in front of the low shore line between Great Ledge and Pea Island.

A ridge begins at Pea Island Point and runs north-east about 350 yards, then turns to the north-west. A second ridge rises abruptly from the coast line between Great Ledge and East Point. The average height of these ridges is about 30 feet although on each there are three knolls which rise from the ridge proper to a further height of 10 to 20 feet. The east side of the first ridge and the west side of the second fall off gradually forming a valley between the ridges.

plunging as possible, so that the danger zone for each range should be as deep as possible. These guns are not designed to attack deck armor; their function is solely the attack of vertical armor, and the best conditions for its attack are to have the heavy guns on low sites. No disadvantage from so placing them arises, from the fact that our large-calibre guns are to be mounted either on gun-lift mounts or on disappearing carriages, in each of which cases the cannoneers have ample protection.

The guns should be separated, in pairs or in groups of not more than three or four; it is a mistake to place a greater number than this together; it offers too tempting a target to the enemy, and enables him to direct a convergent fire on our armament while forcing a divergent fire upon us. By scattering the guns, mounting them singly or in pairs, we not only gain this advantage of a convergent fire, but, in attacking a single ship, we are able to force the ship to fight more or less at a disadvantage in one or more directions.

In accordance with the above, the large guns of the assumed armament are placed as follows:—

Two 16-inch guns at "A," Figure 2; in the angle of East Point. At no point of our coast can powerful guns cover a wider range and protect property of greater value than at this point. On Figure 1, a 6000-yard circle is drawn from East Point as a centre, showing what may be considered the limit of effective artillery fire. These guns should have a mount that would give an all-round fire.

Two 16-inch guns at "A'" Figure 2, on gun-lift or barbette mount.

Two 12-inch guns at "A''" Figure 2, on disappearing-carriage mount.

Two 10-inch guns at A''' Figure 2, on disappearing-carriage mount. A 6000-yard circle from this point shows the effective range of these guns.

Placed in this way, these guns would cover the whole of Broad Sound with a thoroughly effective armor-piercing artillery fire, and the 16-inch guns at East Point would cover the water out to sea to a point over 12 miles from Boston, and, also, all of Nahant Bay.

Somewhat different considerations should govern the placing of the rapid-fire guns. It was desirable with the large guns to mount them on low sites; with rapid-fire guns, however, it is desirable, in so far as possible, to reach the decks of ships, and, therefore, these guns should be mounted as high as they con-

veniently can be. We should, therefore, place them on the high points of ground which rise from the ridges above described,—on the knolls spoken of. This will throw these guns, to be sure, back some distance from the water's edge, but this will be advantageous than otherwise, because it will enable the guns to be so placed that the flanks and faces of the large-gun groups may be swept by the fire from them, and, since they are designed chiefly for the attack of the unarmored parts of ships, their projectiles will have abundant energy for this at any point of the locality. They are, therefore. placed as follows:—

Three 6-inch rapid-fire guns at B, Figure 2.
Three 6-inch rapid-fire guns at B′, Figure 2.
Four 4-inch rapid-fire guns at C, Figure 2.
Four 4-inch rapid-fire guns at C′, Figure 2.

The principle of widely separated emplacements and convergent fire referred to above for large guns applies equally in the case of rapid-fire guns.

The machine-guns should be on mobile, wheeled mounts, and be arranged in such a manner as to make it possible to move them by hand at pleasure and promptly to any part of the fortress. In addition there should be definite places assigned to them along the front of the fortress, and covering provided, and they would habitually be worked from these points at drill and in action against ships in Broad Sound; these points are indicated at M, M′, and M″, Figure 2.

Having settled on the number and calibre of guns to be used in defense of the locality, it becomes necessary to fix the number of men required to properly serve them.

Since the guns must all be manned and fought at the same time, and since an action may continue for several hours—longer than one set of men could stand the physical strain, it will require at least two reliefs for the continuous service of the guns under war conditions.

The complete "service" of a gun will be considered as including all operations connected with its use; that is, providing an ample and continuous supply of powder and projectiles, loading, laying, and firing it. For convenience, this service may be sub-divided into three operations, as follows:

1. Loading and laying the gun.

2. Supplying powder.
3. Supplying projectiles.

A separate detachment will be required for each of these operations. They will be called, respectively, The Gun Detachment, The Powder Detachment, and The Projectile Detachment.

THE GUN DETACHMENT.

It is not likely that the new guns will require a larger number of men for their service than the old 15-inch smooth-bore gun. For, notwithstanding the fact that the powder charges and projectiles, as well as the guns and carriages, are enormously heavier than those of the old-type sea-coast ordnance, the introduction of labor-saving devices makes the new material no more difficult to handle than the old. We may, therefore, assume that one gun detachment will consist of the following non-commissioned officers and men: —

1 sergeant, chief of piece.
1 corporal, gunner.
10 privates, cannoneers.
2 privates, supernumeraries.

For two reliefs these numbers would become: 2 sergeants, 2 corporals, and 24 privates.

THE POWDER DETACHMENT.

The work of the Powder Detachment divides itself into the weighing and preparation of the cartridges in the magazine, and the transportation of them to the gun. It may be organized as follows:—

1 sergeant, chief of detachment, in charge of the whole service.
1 corporal, in charge of the magazine service.
4 privates, to assist corporal in the magazine.
8 privates, powder-carriers, to transport cartridges to the gun.
2 privates, supernumeraries.

For two reliefs there would be required, 2 sergeants, 2 corporals, and 28 privates.

THE PROJECTILE DETACHMENT.

As for the Powder Detachment, the work of this detachment divides itself into preparation and transportation; the projectiles must be carefully weighed, cleaned and marked at the main supply, and they must then be transported to the gun. It may be organized as follows:

1 sergeant, chief of detachment, in charge of the whole service.
1 corporal, in charge of preparation of projectiles.
8 privates, to assist corporal at main projectile supply.
16 privates, projectile-carriers, to transport projectiles to the gun.

For two reliefs there would be required, 2 sergeants, 2 corporals, and 52 privates.

Two squads of "powder-carriers" and "projectile-carriers," should be provided; one squad to be on its way to the gun while the other would

be returning from the gun for a new load of powder and projectiles; in this way a continuous supply could always be provided at the gun. The numbers given above are based on this arrangement, allowing four men to handle each powder cartridge and eight men to handle each projectile.

Combining the numbers given for the three detachments, there would be required for the complete service of one large gun, allowing two reliefs, the following non-commissioned officers and men:

6 sergeants.
6 corporals.
104 privates.

The general control and direction of all operations connected with the service of one large gun, should be entrusted to a lieutenant. The command and direction of the fire of two large guns should be assigned to a captain. The full complement of officers, non-commissioned officers and men for a group of two large guns, would be, therefore:

1 captain.
2 lieutenants.
12 sergeants.
12 corporals.
208 privates.

The same principles may be applied in determining the number required for the service of the small-calibre guns.

Each 6-inch rapid-fire gun would require for its complete service:

1 corporal, to supervise the supply of ammunition and to aim and fire the gun.
1 private, to manipulate the breech-block.
1 private, to push shot and powder home.
4 privates, projectile-carrriers, two squads of two men each.
2 privates, supernumeraries.

To every three pieces a sergeant should be assigned for purposes of supervision and direction.

Three pieces would constitute a "group," and may be considered as the number that would be fought together on the fighting line; it would be the natural command of a lieutenant, and is so considered. The six 6-inch rapid-fire guns would therefore be divided into two distinct groups, each under the command of a lieutenant. Both groups, together with those of the 4-inch rapid-fire guns referred to below, would be under the general command and control of a captain.

For two reliefs the 6-inch rapid-fire guns would require 2 lieutenants (officers not changed with relief), 4 sergeants, 12 corporals and 96 privates.

Each 4-inch rapid-fire gun would require for its service:—

1 corporal, to supervise ammunition supply and loading, and to aim and fire the gun.
1 private, to load.
2 privates, ammunition carriers.
1 private, supernumerary.

To every four pieces a sergeant should be assigned for purposes of supervision and direction.

A "group" with these guns should consist of four guns, and, as with the 6-inch guns, should constitute the command of a lieutenant.

The complement for two reliefs for all eight 4-inch guns would be 2 lieutenants, 4 sergeants, 16 corporals, 64 privates.

Recapitulating, the service of all the rapid-fire guns would require the following officers, non-commissioned officers and men:

1 captain.
4 lieutenants.
8 sergeants.
28 corporals.
160 privates.

The service of each machine-gun will require the following personnel:

1 corporal, to supervise the supply of ammunition, the loading, and to aim and fire the gun.
1 private, to feed ammunition.
1 private, to carry ammunition.
2 privates, supernumeraries.

A sergeant should be assigned to every two guns.

Every four guns should constitute a "group," to which a lieutenant should be assigned to command it and to direct its fire in action.

Only one relief need be provided for these light guns.

Assuming that the guns will be fought in groups of four, each group being under the command of a lieutenant, and that the whole number of machine-guns (twelve) will be under the general command and direction of a captain, the complete complement required for their service would be:

1 captain.
3 lieutenants.
6 sergeants.
12 corporals.
48 privates.

The personnel required for the service of all the guns may be tabulated as follows:

Guns. No.	Cal.	Capts.	Lieuts.	Sergts.	Corps.	Privts.
4	16-in.	2	4	24	24	416
2	12-in.	1	2	12	12	208
2	20-in.	1	2	12	12	208
6	6-in.	1	2	4	12	96
8	4-in.	1	2	4	16	64
12	Mach. Guns.	1	3	6	12	48
Totals.		7	15	62	88	1040

THE RANGE AND POSITION FINDING SERVICE DIVISION.

Closely associated with the service of the guns is range and position finding. However well our cannoneers and gunners may be trained the full possibilities of a modern defense cannot be reaped without range and position finders. Especially it will not be possible to take full advantage of our system of disappearing gun-carriages unless there be an accurate and quick-working system of position finding used in connection with the guns.

The height of the highest knolls projecting from the ridges that traverse the ground to be fortified is not sufficient to give good results with a depression range finder, therefore one using a horizontal base line will be assumed.

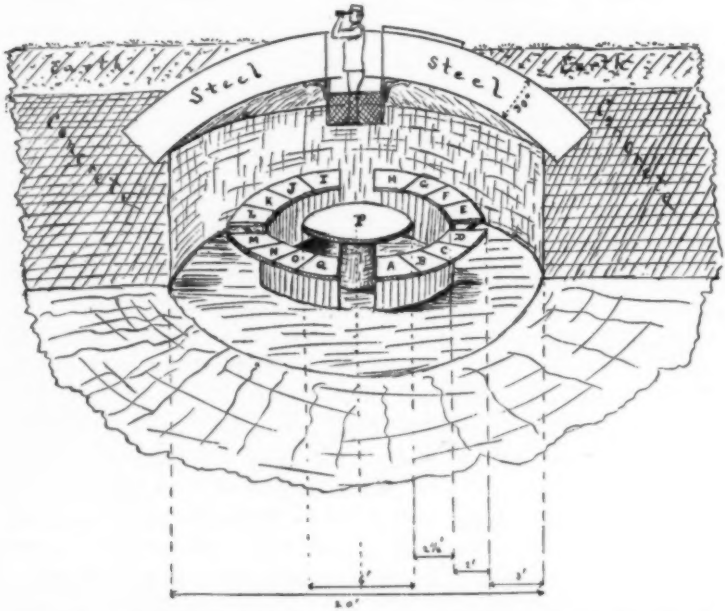
The base line should be as long as the piece of ground will allow. It is important, also, that the observers should have an all around unobstructed view from both ends of the base line. In accordance with these conditions the observers may be placed at O and O′, Figure 2, on the knolls at those points. These afford a good view of all parts of the field of fire and are far enough apart to give a base line that will insure accurate plotting. To allow for possible accidents to either of these observers, and to still further increase the accuracy of the plottings, a third observer is placed on the knoll at O″ Figure 2.

The observing stations at the ends of the base lines should be carefully and strongly built. The interior should give ample room for the observer, his instrument, and "one gunner-electrician" (see next page), who would be in charge of the signal and telephone apparatus connecting with the plotting board; a turret six or eight feet in diameter would probably be large enough; it should be constructed in such a manner as to offer a clear view to the observer and it should be protected by armor or earth against small-arm and rapid-fire projectiles.

The plotting-board, whereon are plotted the positions of all objects fired at, should be immediately under the eye of the commanding officer, so that he may at all times have precise information as to the range and position of the target he is attacking.

The commanding officer must occupy a position from which he may be able to observe the entire area of surrounding water. There is one place on the terrain under consideration which is

preëminently suited to this requirement, namely, the high knoll near East Point, called "Nahant Head." Here, therefore, the commanding officer's turret will be located. This turret should contain, besides the plotting-board, all elements of communication which place the commanding officer in touch with each division and sub-unit of work of the fortress; it should be in the strictest sense of the term the headquarters of the fortress; the central station for all signal, telegraph, telephone, and other electric lines connected with the transmission of information,



power or light; in short, it would be the brain of the entire system, the point to which every element of the fortress would look for guidance and direction, and from which all the energies of the divisions, separately and unitedly would be directed in combat. The turret should be so built as to be inconspicuous from the water, and it should be protected by armor or earth against the attack of the heaviest projectiles.

The accompanying figure offers a suggestion as to the interior dimensions and arrangements.

The plotting-board "P" is placed at the centre of the turret. It should be made in a substantial manner, of either heavy battened boards or of a stone slab. It should be mounted at a convenient height, and be about six feet in diameter. An experienced officer should be assigned to it as plotting and predicting officer. This is one of the most important positions connected with the whole work and the officer should be carefully selected for the place on account of his special qualifications; he should be a captain and should have two lieutenants as his assistants. An accurate map of the field of fire should be spread upon the board; this map should be divided into such blocks and so numbered that the proper signals may be sent to the guns in indirect firing. The map should also have the submarine mines marked and numbered on it.

A three-foot passage-way surrounds the plotting-board, designed for the use of the plotting officer and his assistants while plotting.

Beyond this passage-way there is a circular counter or table 24 inches wide, divided into quadrants by radial passage-ways as indicated in the figure. Each of these quadrants is sub-divided into four desk divisions, each one of which serves as the electrical terminus of a line connecting with some separate sub-unit of the defense. At each desk there should be a telephone (sender and receiver) and such other signal apparatus as each line may require; for example, a "Fisk Transmitter of Orders" (as described on pages 389–90, Proceedings of the U. S. Naval Institute, Vol. XXII. No. 2, whole No. 78.). A "gunner-expert" (described below) should be stationed at each desk, except desk "Q," in charge of the communications connected with the particular division which that desk represents. During "combat-drill," in action, or whenever all divisions of the fortress are operated together, the gunner-expert at each desk will receive, directly from the commanding officer, and transmit to the other end of his line all orders and directions that may be given pertaining to it; at the outer terminus of each line, in immediate contact with each division commander, a duplicate equipment should be provided with a gunner-expert in charge, as explained for the headquarters turret.

"Desk "Q," the electrical service desk, should be a general switch-board through which and to which all lines should go. It should be in charge of the lieutenant assigned as assistant to the officer in charge of the whole electrical service.

The turret, as here arranged, provides that the commanding officer be stationed at its top, where an opening is made through the roof from which he would be able to survey the entire surrounding water and land. A wire platform is provided below the opening to support him, and a set of steps lead from the platform to the floor of the turret.

The desk-lines may be assigned as follows:

Desk "A," to line connecting with observer at O, Figure 2.

Desk "B," to line connecting with observer at O′, Figure 2.

Desk "C," to line connecting with observer at O″, Figure 2.

Desk "D," to line connecting with sub-marine mine testing and firing casemate at T, Figure 2.

Desk "E," to line connecting with the 16-in. guns at A, Figure 2.

Desk "F," to line connecting with the 16-in. guns at A′, Figure 2.

Desk "G," to line connecting with the 12-in. guns at A″, Figure 2.

Desk "H," to line connecting with the 10-in. guns at A‴, Figure 2.

Desk "I," to line connecting with the 6-in. rapid-fire guns at B, Figure 2.

Desk "J," to line connecting with the 6-in. rapid-fire guns at B′, Figure 2.

Desk "K," to line connecting with the 4-in. rapid-fire guns at C, Figure 2.

Desk "L," to line connecting with the 4-in. rapid-fire guns at C′, Figure 2.

Desk "M," to line connecting with the machine-guns at M, Figure 2.

Desk "N," to line connecting with the machine-guns at M′, Figure 2.

Desk "O," to line connecting with the machine-guns at M″, Figure 2.

Desk "Q," besides being in the circuit of all lines named above, would have special lines running to the electric power-house at P, and to each of the search-lights at S, S′, and S″, Figure 2.

The personnel required for the complete service as planned above would be as follows:

1 captain, predicting and plotting officer, in charge of the whole range and position service.

2 lieutenants, assistants, at the plotting board.

3 lieutenants, observers, at the ends of the base lines.

15 gunner-experts, at outer terminals of lines.

15 gunner-experts, at headquarter-terminals of the lines.

Before proceeding to a discussion of the other remaining divisions, it may be well, in connection with the above account, to describe at this point, the manner of operating and controlling the several divisions, from the head-quarter-turret.

Assuming the commanding officer, the predicting officer, his assistants at the plotting-board, the observers, and the gunner-experts to be in their respective positions, and the personnel of all other divisions to be properly placed, the process would be as follows: The commanding officer would determine the target to be attacked. He would direct the gunner-experts at desks A, B, C, to notify the several observers to track, such a vessel, describing the vessel; A, B, and C would at once transmit the order to the observers. The latter would bring their telescopes to bear immediately upon the designated object, and through conventional signals with each other, would take the an-

gles of the target at the same time and transmit them at once to the plotting-board. As soon as the angles were received at the plotting-board they would be recorded and plotted by the plotting officer and his assistants. If the apparatus is automatic, a continuous trace of the target will appear on the map as soon as the observers bring their telescopes to bear on it.

From his previous study the commanding officer will know the ship by its lines and general appearance, and will know also its resisting capacity to the attack of the projectiles of his guns. If it be a cruiser, for example, he need not direct the armor-piercing guns to fire on it, since the fire of the rapid-fire guns will be sufficient, but if it should be a battle-ship, he will direct the fire of all the guns on it. Let us suppose that the target is a cruiser, he will then give the following order: "Rapid-fire and Machine Guns Fire Together." The plotting officer determines from the map the point the target will be at, say, one minute ahead, and orders the gunner-experts to send block-signals to the guns, giving them the block-numbers; the gunner-experts at desks I, J, K, L, signal to the rapid-fire guns: "Ready" "Block No. (—)." Instantly the guns are laid on the designated block, and the signal returned to the plotting-board: "Ready." (For the method of laying the guns on the designated block, see *Journal of the United States Artillery*, Vol. 4, No. 15, pp. 277–79, and No. 17, 655–56.) A firing-key is connected with the plotting.board, and the plotting officer, watch in hand, notes the lapse of the "minute" for which he made the prediction; when the minute has just expired, he presses the key and all the rapid-fire guns are discharged. In the same way any single gun or group of guns could be fired by the officer at the plotting-board, or all the guns of the fortress could be fired in salvos. If the commanding officer desires the guns to be fired at will, the target and its range are signalled to the guns and the order sent: "Fire at Will." The guns specified would then proceed to load, aim, and fire without further direction from the plotting house; the range being signalled to each group of guns from time to time, or continuously by a dial indicator.

If the plotting officer finds the target's plotted position on the map within the destructive range of any of the numbered

sub-marine mines he signals to the testing-casemate: "Set, such, a mine," and when the signal is returned: "Such, mine, Ready," he notes again the plotted position of the target and if still within destructive range he fires the mine by pressing the firing-key.

In this way the commanding officer may keep in perfect control of the fire of all of the guns and mines, and direct the smallest feature of the defense from his position in the head-quarters' turret.

THE ELECTRICAL SERVICE DIVISION.

It is impossible to overestimate the importance of this division. Electricity enters into the operations of every feature of a modern defense. Among all the advances, discoveries, inventions, and improvements of the several sciences, none has exercised a greater influence on coast defense than those of electricity during the last twenty-five years. The development of the dynamo and the storage battery has opened a whole new field in the application of electricity as a source of power and light. The limitless variety of inventions in the class of telephones, telegraphs, and other apparatus for transmission of information have a special bearing in carrying on the multifarious functions connected with the defense of a fortress. The whole range of possibilities within the electrical field is drawn upon by some one or another of the above divisions.

For purposes of organization and instruction the whole electrical service may be divided in the following sub-divisions:—

1. *The Communication Service;* including all lines and apparatus connected with transmission of information.

2. *The Light Service;* including all search and other lights and the lines and apparatus connected with them.

3. *The Motor Service;* including all dynamos and storage-batteries, the motors run by them, and the machines or mechanisms run by the motors.

Owing to the specially scientific nature of this service a body of men must be provided for it, each of whom has been carefully trained in such theoretical and practical electrical work as shall enable them to maintain the system in perfect working order at all times.

The whole service should be under the command and direction of a captain, who should be selected for the position on account of his special qualifications, and each of the sub-divisions should be under the supervision of a lieutenant, likewise selected on account of his special qualifications.

The source of energy for the entire system should be a set of dynamos and storage-batteries. The dynamos should be placed in a power-house located at some secure point such as P, Figure 2. The storage-batteries may be located at the power-house or at such other point as may be convenient. A steam engineer and two firemen will be required to look after this plant and to run it.

All circuits should be completely metallic and placed underground. The main from the power-house should lead directly to desk "Q" in the headquarters turret.

The officer in charge of the Communication Service should be stationed at desk "Q" in the headquarters' turret. All circuits should draw their currents from the switch-board at this desk, and the officer at the desk would at all times have knowledge of the condition of each line; in case of a break or other accident to any line, he would be able to locate it at once, and to give directions for its immediate repair. For the purpose of repairing the lines, a detachment of 12 linemen under a sergeant gunner-electrician would be stationed at the power-house and held ready to respond at once to any call.

Electric search-lights have become an essential in fortress defense. With a properly arranged light service all operations can be carried on at night as well as by day. Without an electric light service the entire defensive position is exposed to the danger of a night attack either from water or from land. All war-ships carry several search-lights, and if fortresses be not provided with them the ships coming against us would have a great advantage in night actions.

It is believed that three powerful lights at S, S′, S″, Figure 2, would give an efficient service for the locality under consideration. The light at S″ should be considered as the *Directing Light;* it is placed near headquarters and its beam would be immediately under the direction of the commanding officer. During action whatever object its beam should rest on would be

the target to be tracked by the observers and to be fired at by the guns. The other lights at S and S′ would either follow the beam of the directing light or be otherwise directed by special instructions from headquarters. Duplicate lights for each light station should be provided, since the lights are apt to draw small projectile fire, and being necessarily exposed, would be likely damaged, in which case the duplicate light could be put in circuit without delay and the damaged one repaired.

Each light should be in charge of a sergeant, gunner-electrician, and the sergeant should have two privates to assist him. Directions from headquarters should be sent from desk "Q."

The lieutenant in charge of the light service should be habitually stationed at the directing light.

Electric motors are being more and more used in connection with the service and mechanical manœuvres of heavy ordnance. Guns now have their motions for both elevation and direction given by electric motors, powder and projectiles are transported to the guns by electric cars or trucks, and raised to loading position by electric hoists; in fact, wherever there is an application of power the tendency is to make use of electric motors; this tendency is especially evident in the mountings and ammunition supply appliances on board recently constructed battleships. In all these cases the installation is such that hand power may instantly be substituted for electricity in case of injury to the electric apparatus. The use of electricity for these purposes is not only a saving of labor, its chief value is, that it so expedites the loading and laying of the guns that it amounts to a positive increase of the offensive power of the guns; it is estimated that for large guns the rate of fire is nearly doubled, a most important consideration in a matter in which time may be the determining factor.

The installation should include, for each large gun, motors for giving both elevation and direction in laying the gun, for moving charges and projectiles at the magazine and main supply, for transporting them to the gun and for hoisting them to the height of the gun in loading position.

These motors would be operated by the gun-service detachments given above.

One sergeant, gunner-electrician, and two privates, gunner-electri-

cians, should be stationed at each group of large guns during action to make promptly any small repairs that might be required.

The lieutenant in charge of the motor service should be stationed habitually at the power-house.

The personnel required for the service of all three sub-divisions of the electrical division would, therefore, be as follows:

1 captain, in general charge of the whole service.

1 lieutenant, in charge of communication sub-division, stationed at general switch-board in headquarters turret.

1 lieutenant, in charge of light sub-division, stationed at directing light.

1 lieutenant, in charge of motor sub-division, stationed at power-house.

1 steam engineer, at power-house.

2 firemen, at power-house.

1 sergeant, at power-house.

12 privates, at power-house.

3 sergeants, at electric search-lights.

6 privates, at electric search-lights.

4 sergeants, at guns.

8 privates, at guns.

Making a total of:

1 captain,
3 lieutenants,
8 sergeants,
26 privates,
1 steam engineer,
2 firemen.

SUBMARINE MINE SERVICE DIVISION.

Submarine mines are important auxiliaries in coast defense, and should always be used in connection with the gun defense; used alone they are of little or no value. Placed about over the field of fire in front of the guns, they force the enemy's ships to either anchor under the guns of the fortress, or to move at a very slow rate, while attempts are made to cut the cables or to remove the mines. Until this is done the enemy cannot manœuvre with freedom, and is in the meantime within effective range of the guns of the fortress.

The mine fields should therefore always be located and adjusted with respect to the fields of fire of the guns. The position of each mine should be carefully plotted on the plotting-board map, and each one should be given a number, which number should be marked on the map in connection with the plotted position of the mine.

The testing casemate, which should contain all the apparatus for testing the mine circuits and setting the mines for firing, should be located at some secure place such as T, Figure 2. From this point the cables lead to the water and thence out to the mines in front of the guns.

During action, if an enemy's ship comes within destructive effect of any of the numbered mines, the mine is set and discharged, as already explained, by the plotting and predicting officer.

The personnel required for the service of this division may be given as follows :

1 captain, in general charge of the whole service.

1 lieutenant, in charge of testing and setting, in testing casemate.

2 sergeants, gunner-electricians, assistants, in testing casemate.

2 corporals, in charge of boats' crews for laying cable and placing mines, and assistants in testing casemate.

18 privates, for boats' crews, and assistants in testing casemate.

Combining and tabulating the personnel of all divisions as given above, the complete garrison required for the fortress on a war footing, will be as follows :

DIVISIONS.

	Gun Service.	Range and Position Service.	Electrical Service.	Submarine Mine Service.	Totals.
Colonel	Commanding Officer				1
Lieut.-Col.	Assistant to Commanding Officer				1
Captains	7	1	1	1	10
Lieutenants.. . . .	15	5	3	1	24
Sergeants	62				62
Corporals..	88			2	90
Privates.	1040		26	18	1084
Steam Engineer.. .			1		1
Firemen			2		2
Gunner-Experts.. .		30			30
Gunner-Electricia's			8	2	10
Gunner-Machinists	7	1			8

The administrative staff and non-commissioned staff duties of the fortress should be assigned and provided for as at present. This would include the usual post medical staff and post non-commissioned staff.

Such a personnel would be able to bring into action at once all the energies of the defense, and work them continuously and effectively together, perfectly and immediately responsive to the will of the commanding officer.

A consideration of the foregoing naturally gives rise to some thoughts bearing on organization and instruction.

A glance at the above table reveals the fact that the requirements as to personnel for each division bears no relation whatever to the ordinary "battery" and "regimental" units. Especially in the range and position, the electrical, and the mines divisions the proportion of commissioned officers, non-commissioned officers and privates is different from the "battery" distribution. Indeed, we here come face to face with the fact that the battery and regimental units have an origin entirely foreign to coast-artillery work, and in speaking of them it is impossible to use the words in the same sense in connection with fortress work and organization as is done in speaking of the work of field troops and the organization of the field army. The words "battery" and "regiment" with field troops suggest at once a relation between the organization and the fighting unit employed on the field of battle, but it is impossible to discover any such relation—any definite fixed number of men constituting the fighting unit in coast defense. Each locality to be defended will have its own special armament and accessories, and the number of men required to work the several elements which go to make up the complete defense naturally constitutes the fighting unit. That is, the fortress garrison is the fighting unit in coast-artillery organization; it is essentially a variable unit, just as the full complement of officers and blue-jackets required for modern battle-ships varies with the armament and accessories on board-ship; in truth, the analogy between the conditions which obtain in a modern fortress and those aboard a modern man-of-war is much closer than those which exist between the former and a regiment of field troops. The modern battle-ship is practically a floating fortress; each division of work specified in the above table is represented on a battle-ship, and all divisions are operated together afloat in much the same way as they must be operated ashore.

Therefore the conclusion is reached that, just as the size and organization of a ship's crew is a problem to be determined by the armament, apparatus and machinery found aboard ship, so should the garrison required for any fortress be determined by similar considerations, independently of any "battery" or "regi-

mental" limitations. If the work to be done suggests a certain ratio of individuals of various grades, it is clearly wrong to either increase or decrease the ratio because of the battery or regimental idea. For example, while it is evident that the important divisions, range and position finding and electrical service should be under the direction of an officer having the experience and rank of a captain, it would be an unnecessary extravagance to provide the number of non-commissioned officers and privates now authorized for each captain in our regimental organization, and conversely it would be impossible to serve a group of large guns with a different or smaller personnel. The personnel of each division must of necessity vary in this way according to its own requirement.

When a fortress is completed and ready to be turned over to the coast artillery, a commanding officer should be selected and ordered to the place to assume command; then such subordinate officers, non-commissioned officers and privates should be ordered to report to him for such assignment as the various features of the defense required. The commandant would subdivide his command and assign it to the several divisions solely with an eye to the work in hand. There would be, thus, an exact adjustment of the personnel to the work in each division.

But our present ideas are governed in these matters by the regimental scheme of organization. The principle of adjusting the fighting unit to the particular work to be done is not considered. If one or two guns or several guns are newly mounted and troops must be ordered to man them, one, two or more batteries are sent, regardless of the precise requirements of the new emplacements; the chances are that there is almost certainly a misfit of personnel to work. Furthermore, the regimental organization does not lend itself to the classification into sub-units of command; even now the "regiment" is a purely paper division; all the batteries of an artillery regiment are rarely if ever together, and with the mounting of the new ordnance they are still less apt to be; the colonel of a regiment as such has practically no command or control over his regiment as a whole; little by little he has been so stripped of regimental functions that he is a mere figure-head beyond his sphere as a post commander. It may therefore with truth be said that we have no

organization whatever, properly so called; the system of post administration followed in our army cannot rightly be termed organization, under any accepted definition of the word.

The regiment and battery are units pertaining to troops which form a part of the *corps d'armé;* they were designed originally for operations inland and for the line of battle, and should, properly, be limited to those uses. There they have a *raison d'être*; in coast-artillery organization, however, they are not only useless but positively harmful.

Perhaps the survival of this antiquated unit in our new environments is due to the fact that our new surroundings and the new conditions were not appreciated by those who have had occasion to consider these questions heretofore. It is true that coast-defense, as now practised abroad and as spoken of and thought of by us here, is a comparatively recent evolution. It is the result of the marvellous progress of the sciences during the past half century, every step of which has had its influence on some feature of heavy artillery work. Especially the development of electrical machines and apparatus, the competition between ship armor and guns, and improvements in ship construction have operated to differentiate what is really a new field. Much of the confusion to-day in regard to coast-artillery organization and instruction results from a failure to fully grasp these new facts and relations. If we shall be able in any way to make clear to those in authority the character of the work we have before us, if they can be made to understand the precise nature and the interworkings of the several divisions of work in coast-defense warfare, there is little doubt, I think, that the incubus of regimental organization which has for so long neutralized our best efforts, may speedily be shaken off.

Turning from the consideration of a single fortress to that of a section of the coast including several fortresses, the same principles should be applied. The plan of defense for a harbor should involve the grouping of the armament and accessories, as has been done above, into definite units under the command of artillery field officers; the unit in each case being based on the kind of attack to be expected. In this way the number of guns would vary from point to point and fortresses of different degrees of importance would result, which might be designated

fortresses of the first class, second class and third class, suitable for the normal command of a colonel, lieutenant-colonel and major of artillery, respectively. Thus the principle is reached that the number of field officers of our organization should be adjusted to the number of units of command contemplated by our complete scheme of coast defense.

It must be admitted that officers and men assigned to such a scientific branch of service should be classified in some way—according to some system—apart from the other defensive forces of the nation. The question arises, What lines should be laid down? It has been pointed out that the organization adapted to field troops is not suitable for coast artillery; that an organization is needed which lends itself to commands of varying sizes and proportions of armament; one that will admit of variation in the composition of the numbers and grades of the personnel of its fighting units without limit. I know of no form of organization that meets these requirements, except the corps; that is, a body of officers, non-commissioned officers, and privates with no fixed permanent internal divisions within the body; that allows in any and every case the precise assignment of personnel to matériel that the care and service of the latter requires. In accordance with this conclusion, let us proceed to consider such an organization in a purely suggestive way.

Just as the personnel required for the defense of a particular locality is dependent on the armament and accessories required at that point, so is the personnel required for the defense of the whole coast to be determined by a consideration of the matériel proposed for the defense of the entire coast line.

The report of the Board on Fortifications or Other Defenses proposes the following guns, electric search-lights and submarine mines for twenty-one of the most important points on our coast, with which has been incorporated estimates for the same elements for two other points not included in the board's report, namely, the Eastern Entrance to Long Island Sound and Puget Sound. (See table on next page.)

These guns, mortars, mines and search-lights, together with the range and position finding apparatus, electrical machinery and appliances and rapid-fire guns, not included in the report of the Fortification Board, constitute the matériel, the care of which

Ports.	16-in.	12-in.	10-in.	8-in.	12-in. Mortar.	Total Pieces.	S. Mar Mines.	Search Lights.
Portland, Me	..	20	10	10	48	88	350	16
Portsmouth	..	4	4	..	..	8	161	8
Boston	8	10	15	10	132	175	400	20
Narragansett Bay	2	10	10	..	48	70	300	8
E. Entr. L. I. Sound	4	4	4	..	32	44	150	12
Willet's Point	6	10	5	5	48	84	1250	20
S. Apprch. to N. Y.	14	30	15	10	96	165		
Philadelphia	..	10	5	5	16	36	250	12
Washington	..	7	6	..	..	13	150	8
Baltimore	..	5	5	5	16	31	100	4
Hampton Roads	4	10	20	..	16	50	400	8
Wilmington	..	4	5	..	..	9	150	4
Charleston, S. C.	..	8	4	..	16	28	150	4
Savannah	..	3	6	4	16	29	300	12
Key West	2	10	..	..	32	44	150	4
Pensacola	..	2	4	..	..	6	200	4
Mobile	..	12	..	10	16	38	300	4
New Orleans	..	20	..	10	..	30	150	8
Galveston	..	..	..	8	16	24	150	4
San Diego	..	..	4	..	..	4	150	4
San Francisco	14	20	71	5	128	238	1050	28
Portland, Ore	..	..	12	7	32	51	300	6
Puget Sound	2	10	10	..	48	78	300	8

in peace and the service of which in war form the true objective of all our aims.

Our coast defense troops should be so organized that this matériel may be properly and economically taken care of in time of peace, and that officers and men may be instructed thoroughly in the details of each division and in the combined work of all the divisions.

These two objects, therefore, care-taking and instruction, should be our chief guides in arriving at a definite form of organization. Particularly the working out of the best methods to be adopted for keeping the matériel in a highly serviceable condition must receive our careful study and will, in itself, constitute almost a new branch of scientific work.

Adhering to the lines of work followed above in treating of a single fortress, let us assume that our entire coast line is divided into fortress units, each under its appropriate commander. The organization in each would arrange itself as follows:

1. *Command and Administration.*—Consisting of 1 field officer, 1 adjutant with rank of lieutenant (a special officer required only for fortresses of the first class), 1 quartermaster with the rank of lieutenant (a special officer only required for fortresses of the first class), the non-commissioned staff now allowed each post, and the medical staff as now provided for

each post. At the smaller fortresses the duties of adjutant and quartermaster may be performed as now by officers assigned to perform them, in addition to their regular duties.

2. *Gun Service.*—Consisting of 1 captain, 2 lieutenants, 8 sergeants, 1 machinist, 8 corporals, and 125 privates; these numbers allow for the service of two large guns and for 2 sergeants, 2 corporals and 29 privates in excess, for details and other contingencies. The annual programme would provide for drill at each type of gun mounted in the fortress.

3. *Range and Position Finding Service.*—A distinct complement of officers and men is required for this division. Regular instruction would be given throughout the year to all candidates for the grade of "gunner-experts." The service would always be used in simulated firing drill. For these purposes we may put the numbers of officers and men as follows: 1 captain, 1 lieutenant, 2 sergeants (gunner-experts).

4. *Electrical Service.*—This division will also require a separate complement of officers and men. It would be employed daily in operating the light, motor, telegraph and telephone lines, which would be in more or less continuous use for instruction and other purposes, and in keeping all parts of the system in working order. The following would probably be sufficient for each fortress: 1 captain, 1 lieutenant, 2 sergeants (gunner-electricians), 2 privates (gunner-electricians), 1 steam-engineer, 2 firemen. Non-commissioned officers and intelligent privates would be given a course in electricity, as explained below, and those qualifying at a final examination would be graded as "gunner-electricians."

Such a personnel for each fortress would provide for each branch of work and by organizing it in this way into distinct complements for each division, the units of command for drill, instruction, caretaking, would be the same as the regular fighting unit in time of war. Indeed, the passage from peace conditions to war conditions would require simply an increase in the number of privates, and a few subaltern officers. As a result of the regular yearly drills and course of instruction in the separate divisions and in the combined drills in simulated firing and target practice, both officers and men, throughout the service, would be at all times perfectly familiar with the workings of the system.

The following table gives the number of officers and men required for the ports named by the Fortification Board:

An examination of the table shows that we may provide for the performance of this work in this way by grouping the armament into fourty-four units of command, consisting of ten fortresses of the first class, commanded by colonels, fifteen fortresses

PERSONNEL REQUIRED TO GARRISON FORTRESSES AND MAN ARMA

	PORTS.	No. of Large Guns and Mortars.	Units	Fortress Commandants.			Fortress Administrative Staff.				Gun Division.						Range and Position Finding Division		
			No. of Fortresses.	Colonels.	Lieut. Colonels.	Majors.	Adjutants.	Quartermasters.	Sgt. Majors.	Q. M. Sergeants.	Captains.	Lieutenants.	Gunner Machinists.	Sergeants.	Corporals.	Privates.	Captains.	Lieutenants.	Gunner Experts.
1.	Portland, Me.....	88	2	..	1	1	..	..	2	2	2	4	2	18	18	325	2	2	4
2.	Portsmouth.....	8	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
3.	Boston.....	175	6	2	1	3	2	2	6	6	6	12	6	58	58	1075	6	6	12
4.	Narragansett Bay..	70*	2	1	1	..	1	1	2	2	1	4	2	22	22	450	2	2	4
5.	Long Island Sound	44	1	1	..	..	1	1	1	1	1	2	1	12	12	250	1	1	2
6.	New York.....	249	8	2	3	3	2	2	8	8	8	16	8	78	78	1475	8	8	16
7.	Philadelphia.....	36	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
8.	Baltimore	31	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
9.	Washington.....	13	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
10.	Hampton Roads...	50	1	1	..	..	1	1	1	1	1	2	1	12	12	250	1	1	2
11.	Wilmington, N. C.	9	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
12.	Charleston, S. C...	28	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
13.	Savannah.....	29	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
14.	Key West.....	44	1	1	..	..	1	1	1	1	1	2	1	22	12	250	1	1	2
15.	Pensacola.....	6	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
16.	Mobile.....	38	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
17.	New Orleans.....	30	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
18.	Galveston.....	24	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
19.	San Diego.....	4	1	..	..	1	..	..	1	1	1	2	1	8	8	125	1	1	2
20.	San Francisco.....	238	8	2	1	5	2	2	8	8	8	16	8	74	74	1275	8	8	16
21.	Portland, Ore.....	51*	1	..	1	..	..	..	1	1	1	2	1	10	10	200	1	1	2
22.	Puget Sound.....	78	2	..	1	1	..	..	2	2	2	4	2	18	18	325	2	2	4
	Totals.....		44	10	15	19	10	10	44	44									
	Totals for one-half the full number of fortresses.....		22	6	7	9	6	6	22	22									

* Estimated.

AN ARMAMENT FOR CARE-TAKING AND INSTRUCTION, IN TIME OF PEACE.

	Range and Position Finding Division.				Electrical Division.						Submarine Mine Division.						TOTALS.							
	Captains.	Lieutenants.	Gunner Experts.	Gunner Machinists.	Captains.	Lieutenants.	Gunner Electricians.	Gunner Machinists.	Privates.	Steam Engineers.	Firemen.	Captains.	Lieutenants.	Gunner Electricians.	Gunner Machinists.	Sergeants.	Corporals.	Privates.	Captains.	Lieutenants.	Gunner Experts.	Gunner Electricians.	Gunner Machinists	Sergeants.	Corporals.	Privates.
	2	2	4	..	1	1	5	..	6	2	4	..	..	..	..	4	8	20	5	7	4	5	2	22	26	345
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	3	2	2	1	10	12	135
	6	6	12	..	3	3	15	..	18	6	12	2	2	2	..	12	24	60	17	23	12	17	6	70	82	1135
	2	2	4	..	2	2	6	..	8	2	4	1	1	1	..	4	8	20	7	9	4	7	2	26	30	470
	1	1	2	..	1	1	3	..	4	1	2	1	1	1	..	2	4	10	4	5	2	4	1	14	16	260
	8	8	16	..	5	5	21	..	26	8	16	2	2	2	..	16	32	80	23	31	16	23	8	94	110	1555
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	1	1	3	..	4	1	2	.	..	..	.	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	4	2	2	1	10	12	135
	1	1	2	..	1	1	3	..	4	1	2	1	1	1	..	2	4	10	4	5	2	4	1	14	16	260
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	3	2	2	1	10	12	135
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	1	1	3	..	4	1	2	1	1	1	..	2	4	10	4	5	2	4	1	14	16	260
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	3	2	2	1	10	12	135
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	3	1	12	14	210
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	3	2	2	1	10	12	135
	1	1	2	..	..	..	2	..	2	1	2	..	..	..	..	2	4	10	2	3	2	2	1	10	12	135
	8	8	16	..	3	3	19	..	22	8	16	2	2	2	..	16	32	80	21	29	16	15	8	90	106	1405
	1	1	2	..	1	1	3	..	4	1	2	..	..	..	..	2	4	10	3	4	2	2	1	12	14	210
	2	2	4	..	1	1	5	..	6	2	4	..	..	..	..	4	8	20	5	7	4	5	2	22	26	345
																			133	167	88	116	44	510	598	8315
																			66	84	44	58	22	255	299	4157

of the second class, commanded by lieutenant colonels, and nineteen fortresses of the third class, commanded by majors.

The total number of officers and men is ten thousand and twenty, consisting of three hundred and fifty-one officers and nine thousand six hundred and sixty-nine men ; a force believed to be reasonable and moderate, considering that it is intended to man and care for, in time of peace, the entire armament of these twenty-three ports named, and to provide a nucleus around which the greater number that will be required in time of war may congregate and be speedily assimilated.

But it will be many years, perhaps, before all of these ports will have received the armament assigned to them by the Fortification Board, and therefore this full complement is not now needed, and will not be needed for some time. It is therefore clearly advisable to provide only a fraction of the numbers given in the table. If we should provide for one-half of the number of fortress units given in the table it would probably answer the immediate needs and those likely to arise within the next few years. Let us, therefore, assume that for the present, it would be sufficient to man 22 fortresses, made up of 6 fortresses of the first class, 7 fortresses of the second class, and 9 fortresses of the third class. This would call for the following personnel :

6 Colonels.	57 Gunner-electricians.
7 Lieutenant Colonels.	22 Gunner machinists.
9 Majors.	255 Sergeants.
66 Captains.	299 Corporals.
79 Lieutenants.	4157 Privates.
44 Gunner-experts.	

In addition, there would be required, 22 steam engineers, 44 firemen, and the medical and non-commissioned staff as now authorized. This makes a force of 166 officers and 4900 men, or a total of 5066, required for the artillery service proper. It must be admitted that this is not an excessive number of either officers or men to carry on, in a proper scientific way, the work of coast defense in all its phases, along our extensive sea-board.

This would provide instruction and fighting units for the exposed ports as follows :—

First-class fortresses :—	Boston	1
	New York	3
	San Franciso	2
	Total . .	6

Second-class fortresses:—	Portland	1
	Narragansett Bay	1
	L. I. Sound	1
	Hampton Roads	1
	Charleston	1
	Key West	1
	Puget Sound	1
	Total	7
Third-class fortresses:—	Philadelphia	1
	Baltimore	1
	Washington	1
	Savannah	1
	Pensacola	1
	Mobile	1
	New Orleans	1
	Galveston	1
	Portland, Ore.	1
	Total	9

Of the 23 ports on the list of the Fortification Board, this provides for a care-taker and instruction garrison for all except Portsmouth (8 guns), Wilmington, N. C. (9 guns), and San Diego (4 guns), for which ports special arrangements could readily be made when the armament for them is mounted and requires manning.

Before leaving this question of organization, it is important that a word be said in regard to the control of this body of coast defense troops, and as to the manner in which uniform instruction, drill and general methods shall be obtained. It has been shown above that the present regimental designation means practicably nothing so far as coast artillery work is concerned—that as a matter of fact we have no organization beyond a battery unit. It was at the same time stated that the existing post system of control could not properly be considered as a system of organization for artillery ends, but that it is rather a system of administration adapted to field troops. It seems proper at this point to call attention to the fact that the next higher step in our present method of controlling the instruction, drill and technical work of heavy artillery is not calculated to produce always either uniformity or a high order of efficiency. As now

arranged each department headquarters is the centre from which these matters are controlled. Some field officer of artillery on duty in the department is selected to supervise them, under the department commanders; on these two officers all the details, and the spirit with which the whole programme is carried out rest. Now it is not a criticism of a personal nature to record the fact that it has occurred at times that neither the one nor the other of these officers has possessed either the knowledge or inclination to fit him to perform the duties naturally pertaining to coast defense drill, instruction and direction; it has happened in the past that neither the department commander nor the Inspector of Artillery has had any special training that fitted him to control and direct the technical work of so scientific a branch of the service. Department commanders are, as a rule, officers who have passed their lives in the study of duties pertaining to field troops, and have had no opportunity to investigate and familiarize themselves with the many phases and complexities of coast defense work. Indeed, there has not been a general officer appointed from the artillery branch of the service for many years, and, in consequence, all included in the field of instruction, drill and control has, ultimately, drawn its inspiration from officers of cavalry and infantry, some of whom have never seen the interior of a sea-coast fort. We may easily imagine the spirited objections that would be raised in season and out were these conditions reversed, and were our brothers of the cavalry and infantry to find themselves commanded for as long series of years by officers of heavy artillery who have passed their lives in coast forts, devoting their energies to the study of naval coast attack and the best way of meeting it.

Again, the present unnatural union between coast and field artillery is sometime the means of placing over coast defense matters one who is essentially a field artilleryman; one who is an excellent judge of horses and familiar with harness and draft problems, etc., but who is densely ignorant of and has an innate distaste for the mathematics of ballistics and the problems of applied electricity, explosives, etc., which form, in a large measure, the ground-work of heavy artillery instruction. Probably no question of recent discussion has come to be so generally admitted as that of the urgency of a complete separation of

the coast and field divisions of our artillery; it is a question that has been strongly argued from both the field artillery and the coast artillery standpoints, and always with the same conclusion. To get the best results, a field artillery officer should be allowed to give all his time and attention to field artillery drill and study, just as the cavalry and infantry officer is permitted to concentrate all his efforts on one branch of work, and the same is true of a coast artillery officer. There is a closer affinity between cavalry or infantry and field artillery than between the latter and coast artillery, since the former are all associated together as auxiliaries and sub-divisions of the field army, while coast artillery is completely divorced from inland manœuvres of all kinds, and, therefore, it would be more reasonable to require the cavalry or infantry officer to perform the duties and make a professional study of field artillery than it is to require the coast artilleryman to do so. The duties of field and coast artillery are, moreover, so diverse in their nature, that experience shows that each calls for a distinct type of individual; that an officer will find himself so constituted that one set of duties is agreeable to him, and with deep interest and even affection he can let his energies run out in study and drill, while the other is a perfect grind against all his nature. It is evident that our organization should take cognizance of these limits which nature itself imposes.

It cannot be surprising that in consequence of the misfits in those positions which determine and regulate the instruction and methods of coast artillery work, there should be low standards of instruction in some cases, and that there should be different standards and methods in each military department.

The correction of this defect in our system of control is believed to be the most pressing reform now before us. Until something can be done in the way of securing uniformity of methods and instruction throughout the entire coast service we must drift along in the tentative cycles of the past. Until we can have one in control of these matters who is fitted by training and study to fix and direct the technical details of our branch of defense work, it is not to be expected that there will be any decided and permanent improvement in either instruction or methods.

Having the accomplishment of this reform in view, it has been suggested that the coast line of our country, with the heavy artillery troops now stationed in coast forts, be organized into a separate and distinct military department, under the command of one of the brigadier generals of the army, who would be appointed from the artillery. It is claimed that the number of officers and men included in such a division of our country and our forces, apart from the importance of the work and its scientific nature, is amply sufficient to warrant the appointment of a brigadier general to such a command; and furthermore it is claimed, that in view of the long time since a general officer has been appointed from the artillery, it would be, just now, merely an act of ordinary justice to make the next appointment of a brigadier general from the artillery branch of the service. To be sure our old stars, Hunt, Barry, French, and Ayres, are below the sod resting in their colonels' uniform, awaiting the last trumpet call, and other lights have sought the seclusion of the retired list, or have been placed there by the operation of law, nevertheless we have field officers of artillery who have devoted themselves assiduously for years to the study of sea-coast defense and the details of heavy artillery work and are well fitted to assume the command of a department of the coast, and to undertake the development and direction of a system of coast defense instruction, properly so called; it would be not only a deferred recognition of the artillery's claim in this matter, but would effect a reform of much importance to the artillery, to the army and to the country. (This was written before the appointment of General Graham.)

The creation of a department of the coast, and the assignment of the heavy artillery troops to such a department is a matter that could be effected without resort to legislation; it rests entirely with the Secretary of War and requires only the order of the War Department to put it into operation. It is a change that would involve no expense whatever. I know of no act or suggestion, that does not involve legislation, which would work so great a good to practical coast defense along the whole line; but such a reform as this should not be permitted to obscure the urgency of a complete reorganization, according to the principles set forth herein.

It is in order now to consider briefly the bearing that this classification of the work of defense into "divisions" has on the question of instruction of officers and men.

The coming artillery officer must be a master in each division of the four, which, together, make up the unit of defense. He must not only be an expert gunner and ballistician, he must also be an electrician, and have a chemist's knowledge of high explosives. The delicate machines and apparatus connected with the range and position finding division and the electrical division, and the complex machines now used with gun-carriages and to supply ammunition to large guns, require that he have considerable knowledge of mechanisms and mechanical engineering. The artillery has seen this drift for some time, and, in so far as it could, it has met the question by arranging admirable post-graduate courses in electricity, chemistry, and mechanism at the artillery school and by placing these departments under officers who are specialists in their respective lines. While powerless to break down the restrictions due to our present organization and to the separate control of artillery instruction from each department headquarters, the artillery school, within its little sphere,—where, alone, the "Corps" principle of organization is now in operation in our artillery service—has served as a centre from which, with each new graduating class, healthy impulses have gone forth into the artillery world outside, and, in consequence, little by little, artillery officers are getting to think and speak alike in regard to professional topics; there was a time, not so very far back, when there was no uniformity of views on any matter, and, indeed, very little thought in regard to any of the now pressing artillery questions. It is something to be in the process of leaving this stage behind us, and the influence of the artillery school is, in large measure, responsible for the change.

As our artillery officers receive their special education in coast-defense at the Fort Monroe school, it becomes necessary to refer to its curriculum. We are fortunate in having so good a school and one so well managed, but, it seems to me, that, good as it is, and progressive as it has shown itself to be, there is still one serious deficiency in its course of instruction. There was not in the old programme of instruction, nor is there in the

new, so far as I can discover, an adequate treatment of the application of the details of the science of artillery in the defense of coast positions. About the only attention given to this important feature of the heavy-artilleryman's education is in the department of engineering (p. 8, Programme of 1893), where under the heading "Fortifications," we find the items: "Harbor defense: positions, strength and composition of batteries, position of mines and floating defenses, number and kind of troops required; attack and defense of positions."

Now this, it seems to me, instead of occupying a subordinate position in the department of engineering, should be the climax of the entire artillery school course; being in fact the subject which involves the application of the details of all the other departments. After the student officer has gone through and acquired a knowledge of the details included in the courses of electricity, mechanism, ballistics, and explosives, he should then enter that department in which he should be called upon to study the application of these details to the defense of the coast line of our country and of foreign countries. Associated with this should be a careful study of battle-ships in their defensive and offensive relations, and fleet tactics in attacking coasts. This department may, in truth, be termed the department of artillery art, since it embraces the application of the scientific details acquired in the other departments of instruction.

Again, I cannot understand why, in a school given up essentially to the study of coast artillery and the defense of the coast by the use of coast artillery, with a course already well filled and other artillery subjects standing at the door knocking, three and a half months (March 15 to June 30, of the second year) should be devoted to the study of such infantry subjects as "Minor tactics, Battle tactics, Strategy," etc., in the department of military science. That is to say, after careful study in the departments of ballistics, electricity, mechanism, and artillery, when the student officer ought to be in a position to study to best advantage the application of all that he has acquired in general problems of coast defense, he drops permanently, so far as the school is concerned, all artillery subjects, and takes up during the rest of the school course a purely infantry subject, one that has no bearing directly on coast defense.

On the other hand, the subject of "harbor defense, etc.," in the department of engineering, referred to above, is studied at the very beginning of the school course, in October and November of the first year. It is of course impossible for student officers at that stage of the course to derive the same advantage from the study of this subject that they would if it were taken up after, instead of before, the other studies.

As a matter of fact, therefore, this important subject receives no proper or extended treatment at any point of the Fort Monroe course.

With due diffidence I venture to suggest that better results would be obtained if the course were rearranged with a view to giving this subject a more prominent place in the curriculum and assigning to it ample time for the fullest consideration.

It would seem to be advisable to give it the time and place now assigned to the department of military science. The latter could very well be transferred to the Fort Riley school, which, it is believed, ought to be developed into something more than a purely practical school. If this be not done, and it is considered desirable that artillery officers should have a post-graduate course of strategy, etc., it would in every way be better to detail artillery officers to the infantry school at Fort Leavenworth to take this particular course, as well as those subjects in field engineering, such as "reconnaissance, map-making, etc.," which are essentially subjects pertaining to field troops and yet occupy a prominent place in the Fort Monroe curriculum. The detail of artillery officers to Fort Leavenworth to take these studies could be arranged and conducted in the same way as the detail of officers to Willet's Point under existing orders to take the course in submarine mines.

It is believed, however, that we should come squarely to the point of realizing and acknowledging that the coast artilleryman has no more to do with the manœuvres of field troops than the sailor has; his sphere is strictly within the limits of the fortress and in the service of its armament and accessories, just as much so as that of the sailor is in connection with the battle-ship, its armament and accessories. If coast artillerymen develop the full possibilities of a modern fortress defense, operations inland or landings at a distance from the fortress must and ought to be

left as the legitimate sphere and function of field troops; it is very necessary that we keep distinctly in mind that our function is to fight ships, and that the infantry and other foot troops must attend to all foot forces of the enemy which enter our country across any frontier, whether it be a land frontier or a water frontier.

With the infantry subjects eliminated from the Fort Monroe course it would be possible to reorganize the course in the department of ballistics, assigning to it all subjects pertaining to ballistics, such as armor (ballistics of penetration), metallurgy of gun metal, gun construction and gun carriage construction, (which involve the forces developed by explosion and may therefore be considered as pertaining to interior ballistics), and gunnery (exterior ballistics). These embrace practically all the subjects now in the department of artillery. The department of artillery could then have the time now given to the department of military science, and the course in it could be arranged so as to include the fullest possible treatment of the use of heavy artillery in the defense of the coast line and a detailed study of battle-ships as to their appearance under varying conditions and their powers of resistance to the attack of coast artillery projectiles, also the tactics of fleets in attacking coast forts and in bombarding seaport cities.

It is believed that the "lack of definite conceptions," referred to at the beginning of this paper, is to be explained, in part, by this omission in the Fort Monroe course; our officers have not had the details of the use of artillery in coast defense ever brought authoritatively before them, and are ignorant of the naval questions involved in coast attack.

The instruction of the officer should be complete when he leaves the artillery school, except in so far as it may rest with him personally to keep abreast of the current developments throughout the whole range of the sciences which have a bearing on our work, and to glean from these principles susceptible of application within our special sphere. An admirable illustration of what I mean is the work of Lieutenant Squier in appreciating the bearing of and applying the experimental work of Dr. Crehore in connection with polarized light, to the measurement of the velocities of projectiles.

A well arranged general programme of instruction for all coast artillery troops, along the lines herein advocated, will serve to stimulate the thoughts and efforts of our officers and tend to improve our system of instruction and drill as a result of their studies and efforts.

We ought also soon to expect that the list of essay subjects for our post lyceums at coast forts would treat of topics pertaining to coast defense rather than of thrilling accounts of battles and military operations of field troops inland. Not that these are not interesting and profitable as general literature, but there is so much to be threshed out within the heavy artillery field that it seems all energies should be directed in these papers toward the solution of the coast defense problems before us.

Turning from the instruction of officers to that of enlisted men, we look out upon a field which, it seems, is hardly yet entered.

Not only must our artillerymen be trained as cannoneers and gunners, a large number of them must be carried on in a progressive course of instruction to include a considerable knowledge of electricity as applied in a coast fortress, some knowledge of explosives, and of machinery. Others must be carried on further in ballistics than the point now attained by "gunners," and must be drilled in the use of ballistic machines and in range-finding and position-finding apparatus.

For the purpose of carrying on this instruction the enlisted personnel of the heavy artillery may be divided into the following classes:

1. *Cannoneers.*—Those who have not been examined yet for the grade of "gunner," or those who having been examined twice have failed to qualify.

2. *Gunners.*—Those who have passed the qualifying examination for the "gunners" grade. It includes both non-commissioned officers and privates. No one should be a non-commissioned officer who is not also a gunner. Gunners should receive one dollar per month extra pay.

3. *Electricians.*—Those "gunners" (non-commissioned officers and men) who have passed through the electrical course of instruction and have qualified at the first examination. One dollar per month additional pay should be paid to "gunner-electricians."

4. *Machinists.*—Those gunners who have taken the course in mechanism and have qualified in the first examination. The gunner machinist is not expected to be an expert general machinist, but merely to be able to do those simple jobs connected with mounting and dismounting guns and carriages, making repairs to them and to other mechanisms made use of in the several divisions of work in a coast fortress. One dollar per month additional pay should be paid to gunner machinists.

5. *Torpedoists.*—Those gunners who have taken the torpedo course and have passed the first examination. One dollar per month additional pay should be paid to gunner torpedoists.

6. *Gunner-experts.*—Those gunners who have passed through all of the above courses, and qualified in each, and who, in addition, have taken an advanced course in ballistics, including the solution of practical problems in ballistics and the use of ballistic machines, and range- and position-finding instruments. Five dollars per month additional pay should be paid to gunner experts.

These classes would be assigned to divisions for instruction as follows:

To the gun service division { Cannoneer class. / Gunner class.

To the electrical service division { Electrician class. / Machinist class.

To the submarine mine division: Torpedoist class.

To the range- and position-finding division: Gunner expert class.

Gunner experts, besides performing the regular duties assigned to them in combined drill and in action, would also act as assistant instructors in all of the above courses. The scope of these courses would be limited strictly to the needs of the "divisions" respectively. With such a limitation it would be possible to carry a class through each year in each division with an eight months' course, having four months for practical combined work. Say, for example, that the instruction year, in this latitude, were to begin October 1st and last until May 31st. It would be conducted in each division by the captain in command of the division, with the lieutenants and gunner experts assigned to the division as instructors and assistant instructors.

The course would be so arranged as to give a thorough theoretical and practical knowledge of subjects pertaining to the division and should terminate with an examination for determining the qualifications of the members of the class. This eight-months course of instruction should be continuous and progressive, leading by easy steps to the final standard.

The remaining four months of the year would be devoted to practical work by the whole command, in which all features of the armament would be employed in combination, under all possible conditions of both night and day action. It would be desirable, and no doubt possible, to arrange with the Navy Department to have, during these months, coöperative work between the fleet of manœuvres and the coast forts. Portions of the fleet could make simulated attacks on the coast, and other portions of the fleet, in coöperation with the fortresses, could put into operation the methods that would have to be used in war in meeting such attacks.

This combined work between the shore defenses and the coast defense fleet appears of surpassing importance. In no other way is it possible to determine how best to bring the land and water branches of coast defense to harmonious methods; in no other way can the precise limits of the sphere of action of each be fixed and the two be made to stand together in supplemental relations. Our past experience points out the urgency of this portion of training. Unless it be undertaken, war in the future will find us, as it has in the past, without fixed and tried methods for combined action, with confused ideas, and without time to develop an effective and satisfactory system. It would be an excellent thing, even with our present organization, if the National authorities and those of the sea-board States would arrange the summer manœuvres of the cruising squadron and the annual practice period of the State naval militia and such heavy artillery troops as may be in the State militia, and such supporting infantry as might be thought desirable, so as to be used together with the artillerymen of the coast fortresses in solving, in practical combined operations, different problems of coast defense. I am convinced that deficiencies of training on the part of all, both National and State forces, would stand out in glaring relief, if this suggestion were carried out.

The limits of such a paper as this hardly warrant going into the details of instruction of the men at each fortress in each division. It is sufficient to have marked off the specific divisions and to have outlined the scope of each. The programme of instruction for the entire Corps of Coast Artillery should be arranged at the *Headquarters of the Department of the Coast*, and the instruction regulated and tested from the same source. The methods employed at the artillery school in instructing officers and men could be applied to each fortress. It would be a *class* system; the course in each division would be divided into a theoretical part and a practical part; there would be a combined practical course for all divisions working together, and the whole would work up to annual manœuvres of the army, navy, and State forces, as a climax of the year's work.

In conclusion, it is to be hoped that a more complete knowledge may be found, generally, abroad, in both professional and lay minds, of the functions of coast fortress defense; that a definite idea may crystallize as to what constitutes the fighting unit of coast artillery and as to how the fractions of this unit are to be controlled and operated by the artillery commanders; that the organization of our heavy artillery may be so changed as to establish some real and reasonable relation between the personnel and the divisions of work in coast fortress warfare; that this organization may be such as to provide, in time of peace, an intelligent and scientific body of men as care-takers of the valuable new material of our coast fortresses; that it may give garrisons for these fortresses of such size, so divided into classes for instruction and drill, and so officered, that a system of instruction and drill may be carried out that will lead a recruit on, progressively, through each separate division of the work, until, finally, he becomes an "expert gunner," and produce thereby, in the aggregate, a thoroughly efficient, highly instructed and trained body of coast defenders.

THE ORGANIZATION, EQUIPMENT AND TRAINING OF A MODERN SIGNAL CORPS.

By Major HOWARD A. GIDDINGS, Chief Signal Officer, C. N. G

A MILITARY signal corps is an American institution, and is peculiar to the armies of the United States. It is found to-day in its fullest development and most effective shape, only in the organized militia of a few of the states, whose troops have been brought to the highest degree of efficiency.

The assignment of the Army signal men to meteorological work for so many years, and the failure of Congress to provide for a suitable organization, have prevented the development in the army of a signal corps in the true sense of the word, since the war corps was disbanded at the close of the Rebellion.

Signal corps are classed in army organization as special or technical troops; their duties pertain to the department of engineering, and they are a part of the Staff. The brigade is the smallest unit to which a signal corps * should be attached. In service, the signal corps of the different brigades would probably be detached and placed under the command of the chief signal officer of the army, corps or division.

The prime requisites for the development of an efficient signal corps are effective organization, complete equipment, and thorough training. The organization must be such as to readily admit of division into sections and squads for service on stations or with special apparatus, and the number of officers and non-commissioned officers required is naturally in excess of those in line organizations.

The brigade corps being the unit, an effective number for visual signal duty is one officer and nine men for each regiment in the brigade; to which should be added an officer and as many professional telegraph operators as may be necessary to operate the field or permanent telegraph lines, an assistant surgeon, a first sergeant, a hospital steward and a machinist; all under the command of the brigade signal officer, who should be attached to the staff of the brigade commander.

* The term "signal corps" is used in this paper to denote a signal company.

The organization, equipment and training described in this paper are intended to apply to the National Guard or volunteer troops, and are exemplified in the signal corps of the Connecticut National Guard, which has been developed on these lines and will be taken as a model.

The signal corps of a brigade composed of four regiments, as in Connecticut, therefore consists of 1 brigade signal officer (captain), 4 signal officers (1st or 2d lieutenants), 1 assistant surgeon, 1 first sergeant, 4 sergeants, 8 corporals, 24 privates, 1 hospital steward and 1 machinist; besides the telegraph section, which in time of peace may, or may not, be organized.

Each lieutenant commands a "section," composed of 1 sergeant, 2 corporals and 6 privates, forming two signal squads. In the National Guard, where the regiments of a brigade are located in different cities, a section of the signal corps may be located with each regiment, thus being available for service with the regiment in case of local disturbance, as well as affording a larger field from which to select the members of the corps, and allowing a representation from all the regimental districts.

In order to allow for expansion, in case of emergency, the size of the corps should be left at the discretion of the Commander-in-chief. The militia law of Connecticut provides for a signal corps as follows: "The brigade signal corps, which shall be a staff corps under the command of the signal officer of the brigade staff, shall consist of as many sections as there are regiments of infantry, which sections shall be known by the numerical designations of the regiments with which they are located; as, '1st Section, Brigade Signal Corps,' '2d Section,' etc. Each section shall consist of a first lieutenant and as many non-commissioned officers and privates as the Commander-in-chief may from time to time prescribe, any or all of whom may, in the discretion of the brigade commander be mounted, upon bicycles or otherwise, and when so mounted each member of the signal corps shall receive an extra compensation of two dollars per day at parades and encampments authorized by law."

The efficiency of a signal corps depends in great measure upon its personnel. A signalist needs a thorough education, a quick intellect, and a ready use of language. Electricians, civil engineers, editors, lawyers, accountants, students, etc., are most

desirable. The members of the telegraph section should be professional operators. Previous military service is to be desired, as habits of discipline will have been formed, and some military knowledge acquired. Young men of good physique, determination and enthusiasm are required; for the service is dangerous, tedious and exacting. In the Connecticut signal corps the average age of the members is 24 years. 76 per cent. of them have been educated at colleges or high schools, and 15 per cent. are professional electrical or civil engineers; the rest being scientists, professional men and clerks.

EQUIPMENT.

A signal corps should be mounted, as rapidity in establishing communication is of great importance, and the distances to be covered as well as the amount of apparatus transported, usually preclude the use of dismounted detachments.

The mount par excellence for the signal corps is undoubtedly the bicycle. Not only do horses cripple the corps by reason of the number of men required to hold and care for them, but they require forage, cannot be easily concealed, make more noise, and are less speedy than bicycles.

The bicycle carries safely, delicate and breakable instruments; the apparatus can be carried with less inconvenience, greater distances can be traversed in a given time, it is silent, is easily concealed, and above all does not detract from the effective strength of the corps.

In 1896 a section of the Connecticut signal corps marched on bicycles with full equipment, from Bridgeport to the State camp, near New London, a distance of 71 miles in 27 hours, (elapsed time) bivouacking over night in the rain. The same section marched on August 15, 1897, 63 miles in 10 hours, 40 miles of it through mud, and 4 miles on a railroad track.

On August 18, 1896, a detail left New Haven at 1.15 P. M. and arrived at camp at 10.00 P. M., a distance of 55 miles, 20 miles of which was marched by night over an unknown road. These marches were made with full field and signal equipment, the men either going to or returning from their stations, where they signalled, bivouacked under shelter tents, and subsisted themselves for several days.

Military bicycles should be strongly built, and bright parts should be enameled or blued, to prevent glitter and rust. They should have a good brake, pneumatic tires, a luggage case within the diamond frame, a tool bag and a cyclometer.

The uniform of the signalist should be adapted to the service, and should conform as nearly as practicable to army regulations. The uniform of the signal corps of Connecticut National Guard is as follows :

Officers :—U. S. regulation service uniform for officers of the signal corps (letters CT. on collar), dark blue straps, riding trousers and boots. Sabres are not worn on field duty, but Colt's new army pistol instead. The officers have a dress uniform U. S. regulation ; chapeau, dark blue knots, dress belt, plain trousers, etc.

The enlisted men have only the service uniform,—U. S. regulation blouse made of extra fine cloth, with a pocket in each breast, closing with a flap and one small button, the army cap or campaign hat, reinforced trousers, leather leggings, blue web pistol belt, Colt's revolver, and a leather dispatch pouch worn by a strap over the shoulder. The chevrons and stripes of non-commissioned officers are black, piped with white, as in the U. S. Signal Corps. Enlisted men wear the signal device on each sleeve and on the cap.

SIGNAL EQUIPMENT.

The visual signal equipment of a brigade corps of the size in question should consist of not less than :

8 Standard heliographs.

24 Standard flag kits.

8 Torch kits, or signal flash lanterns.

8 Field glasses.

8 Telescopes.

8 Box compasses.

8 Field map-cases, with topographical maps of the theatre of operations.

42 Blank message books.

42 Cipher disks.

The electric equipment will depend upon circumstances. In war, such mercantile telegraph lines in the territory occupied

by the army as may be needed will probably be leased or seized by the Government, and operated by professional operators temporarily mustered into service in the telegraph sections of the signal corps. For semi-permanent lines the present army field telegraph train will answer all purposes.

For flying lines, where poles are dispensed with, the writer conceives that the most satisfactory apparatus will be the gasoline motor wagon. This wagon will run on almost any grades, is practically independent as regards motive power and if fitted up with a covered body containing telegraph and telephone in-instruments, batteries, etc., would constitute an ideal field office. With the reels and wire beneath the body, the line could be laid at full speed, and by an attachment easily devised the reels might be connected with the motor, and the wire regained at will. Hand reels and instruments might be stored in the wagon for use where it could not run, and also a harness, in case of accident or very heavy roads.

The operation of the balloon train devolves upon the signal corps, but it is a special service, and a description of the apparatus does not properly come within the scope of this paper.

The field equipment of the brigade corps would consist of:

45 Bicycles.	45 Mess Kits.
26 Shelter Tents.	8 Hand Axes.
45 Blankets.	4 Hand Cameras.
45 Ponchos.	2 Medicine Cases.
45 Haversacks.	1 General Repair Kit.
45 Canteens.	

Each soldier carries his personal equipment, but the signal apparatus should be distributed among the squads in such proportion as to equalize the load as far as possible. The weight should be carried on the wheel and not on the soldier.

Only the pistol, ammunition, haversack and glass should be carried on the person. As the heliograph case and tripods are both quite heavy, one man should carry the case and another the tripod, both men belonging to the same signal squad.

The heliograph case should be suspended by its straps over a rolled blanket attached to the handle-bar, in order that the blanket may take up the jar of the machine. A handkerchief or other cloth should be stuffed between the mirrors in the

mirror box to prevent rattling. The tripods should be tightly fastened horizontally to the right-hand side of upper bar of bicycle frame.

The standard flag kits are too clumsy to carry conveniently, and it is better for each private to carry one jointed staff with two large and two small flags in a canvas case similar to a large fishing-rod case, attached to the bicycle in the same position as tripods.

The torch kit is carried similarly to the heliograph case. When the shelter tent is carried, the jointed pole and pegs (if carried) are rolled inside the blanket roll and a shelter half rolled around blanket. The overcoat is rolled compactly, wrapped in the poncho, and strapped underneath the saddle, where the canteen is also attached. The average rate of march of a signal party fully equipped has been found to be about six miles an hour.

TRAINING.

In training recruits they should first be given instruction in the school of the soldier, so far as it pertains to their duties and equipment, in bicycle riding and care of the machine, and in the use of the pistol, both dismounted and mounted. This instruction should include practice with ball cartridges at targets, similarly to cavalry practice mounted.

It is unnecessary to practice snap shooting, as a cyclist can hold the pistol on an objective with considerable steadiness. The double action pistol should be used, cocking it by pressure of the trigger at the moment of firing. Practice should be had in firing to the right and left while passing targets, in firing to the front while riding straight at a target, and in firing to the rear while riding straight away from it. Instruction should also be given in cooking, using the individual mess kit, and in camping and bivouacking under shelter tents.

It is assumed that while receiving this instruction the recruit will have learned the signal alphabet, and practice in signalling can now commence; at first with the small flag at short distances; later with the heliograph at as great distances as are feasible; followed by night practice with torches and flash lanterns.

Recruits should become proficient in signalling in about a month, if practicing steadily. Each man should be supplied with an instruction book, and should be required to study and recite it. As instruction progresses the signalist should become thoroughly familiar with the use of the cipher disk, the compass, telephone and telegraph, in field work, map reading, etc.

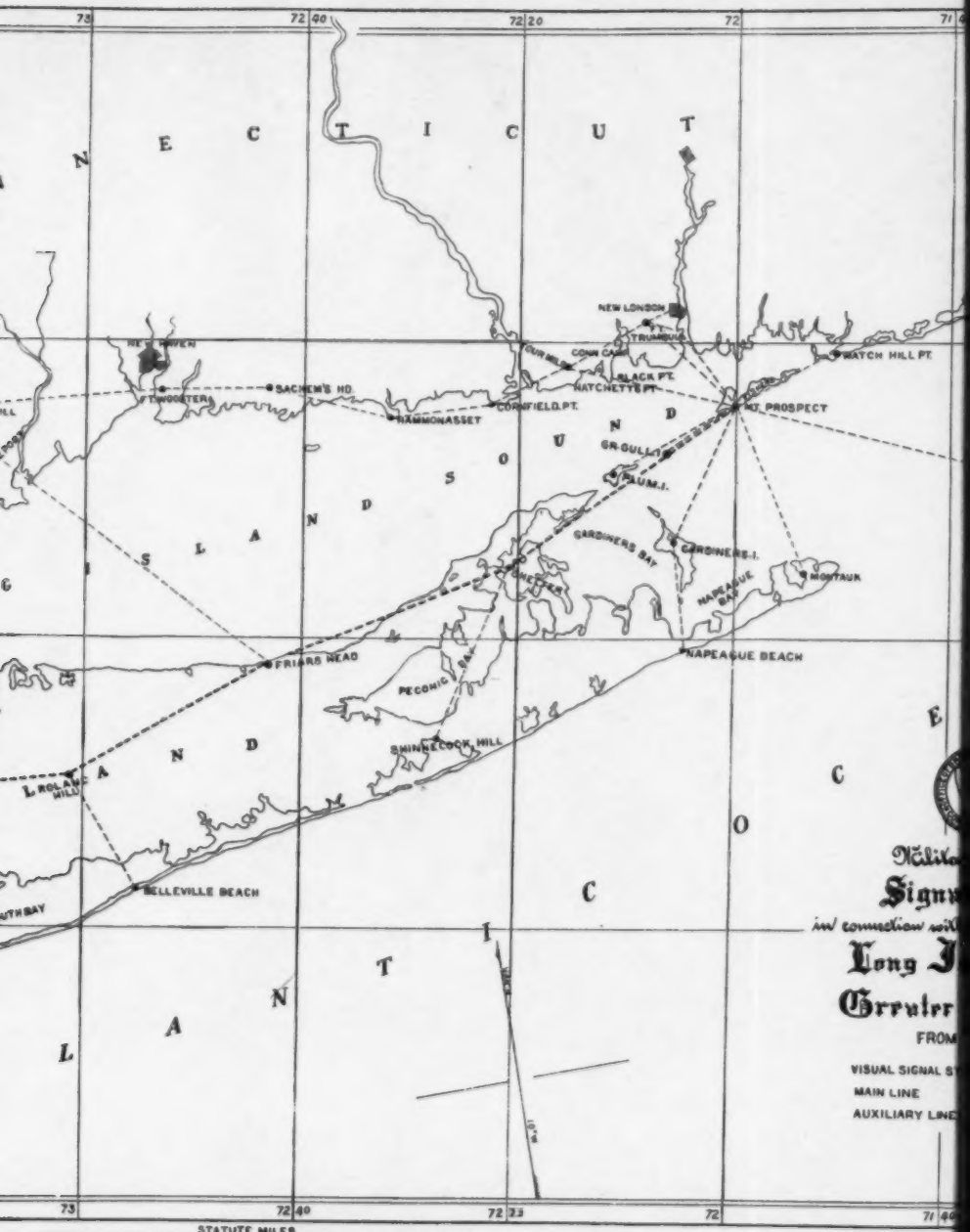
The non-commissioned officers in addition to the above should become proficient in their duties in charge of squads, stations and apparatus, and in field sketching. Selected men should devote their attention to military photography, especially to developing in the field, and to reproducing and enlarging maps.

The commissioned officers of the signal corps should possess a thorough education, a quick intellect, mechanical skill, and a knowledge of organization and the conduct of war. They should be practiced in most of the branches of military engineering, and should be accustomed to staff duty as well as to the command of troops. There is no branch of the service in which military ability and scientific attainment add more to the value of an officer. They should study the theatre of operations and become familiar with its topography; preparing signal maps, and determining in advance points available for stations in order to cover the district to the best advantage, the localities where electric communication will be necessary, the points from which the movements of the enemy can best be watched, etc.

Work of this character in time of peace is most valuable and signal maps of each State should be prepared by the signal officers of its National Guard. The signal map herewith, prepared by the writer, shows the district from Newport, R. I., to Sandy Hook, N. J., with visual signal lines connecting the eastern and the western entrances to Long Island Sound, the stations being so located that every part of Long Island, Long Island Sound, Block Island Sound, and adjacent islands and waters lie within the range of vision of some one of the stations. No troops could land on Long Island, and no ships could approach the entrances to the Sound, or cruise along the coast, without early notice of their approach being given.

Obviously the system is as effective for maintaining touch


74
73 40
73 20
WEST POINT
N.Y. CAMP
PEEKSKILL
TAHAWUS HILL
BRIDGEPORT
S. NORWALK
STAMFORD
NEW YORK
CONN
LONG
ISLAND
NEW JERSEY
NEWARK
JERSEY CITY
HUDSON RIVER
HARRIMAN
HARROW
WEST HILLS
ROSLYN HILLS
BROOKLYN
NEWARK BAY
KILLS
HOWARD
FT. TOMPKINS
FT. HAMILTON
CONEY I.
FIRE I.
JONES I.
GREAT SOUTH BAY
STATEN ISLAND
NEW YORK BAY
RARITAN BAY
SANDY HOOK
ATL


73
72 90
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NEW LONDON
FT. TRUMBULL
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GUR MILLS
BLACK PT.
HATCHETTE PT.
WATCH HILL PT.
NEW HAVEN
SACHEM'S HD.
TWOOSTERS
HAMMONASSET
CORNFIELD PT.
MT. PROSPECT
GR. GULL I.
PLUM I.
GARDINERS BAY
GARDINERS I.
MONTAUK
NAPEAGUE BAY
NAPEAGUE BEACH
FRIARS HEAD
PECONIC BAY
SHINNECOCK HILL
L. ROLAND HILL
BELLEVILLE BEACH
SOUTHBAY
Signal
in connection with
Long I
Groups
FROM
VISUAL SIGNAL ST
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AUXILIARY LINE
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73 40
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NEW YORK
LONG ISLAND
PEEKSKILL
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SACHEM'S HD.
TASHUA HILL
BRIDGEPORT
S. NORWALK
STAMFORD
FRIARS HEAD
PECONIC
SHINNEC
WEST HILLS
ROLAND HILL
HARROW
BELLEVILLE BEACH
GREAT SOUTH BAY
FIRE I.
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I C U T
NEW LONDON
FT. TRUMBULL
GOVS ISL.
COVE CAMP
BLACK PT.
HATCHETTS PT.
WATCH HILL PT.
HAMMONASSET
CORNFIELD PT.
MT. PROSPECT
GR. GULL I.
PLUM I.
BEACON HILL BLOCK
GARDINERS BAY
GARDINERS I.
NAPEAGUE BAY
MONTAUK
NAPEAGUE BEACH
PECONIC BAY
SHINNECOCK HILL
L. I. SOUND
ATLANTIC OCEAN
Military Map No. 7.
Signal System
in connection with the defense of
Long Island Sound
AND
Greater New York
FROM THE EAST
VISUAL SIGNAL STATIONS
MAIN LINE
AUXILIARY LINES
PHOTO. E.V.D. (N.Y.)

with our own ships as for watching the movements of an enemy. The stations have all been used in the coast survey, and each two connected by signal lines are known to be intervisible.

At the annual encampment of the Connecticut National Guard in August, 1897, the signal corps maintained stations at Block Island, Plum Island and Fisher's Island, connecting the latter with the State camp on the main land. The work was made to simulate the conditions of actual war as far as possible, the details reporting the presence of all ships coming within sight of their stations, their character, size, distance, course, etc., and other information of military value.

The distance from Block Island to Fisher's Island is twenty-two and one-half miles, and the total distance from Block Island to the State camp is thirty-seven and one-half miles. On one day, eighteen messages averaging fifteen words each were sent over this line by heliograph, through two intermediate stations. The details bivouacked under shelter tents, and on stations where wood was obtainable, cooked their own food; one of the details being on station five days and the others for four days.

Certainly no instruction could be more valuable than actual signalling in connection with the coast defenses, from the stations which must be occupied in time of war.

GYMNASIUM TRAINING IN THE ARMY.

By Lieut. A. B. DONWORTH, 14th U. S. Infantry.

THE Regular Army of to-day has before it one definite object, that is to take the portion of the nation's citizens who enlist as recruits and put them through a course of training which will make them able soldiers in time of war. The day of Indian warfare has passed, and with it have passed away many of the conditions, both good and evil, which surrounded the army at that time. The first and paramount object of the army was then to defend the frontier settlements. Every inducement was offered the experienced soldier to reënlist because he was needed for immediate service and the training was to a great extent received in the school of experience.

The change to the conditions of the preseent time was so gradual that for a long time it was not recognized as the beginning of a new epoch in the history of the army. But when we notice the stations of the regiments, and especially those of the infantry branch, we cannot fail to remark that the change in this respect alone has been a sweeping one. Of the twenty-five infantry regiments, fourteen are at regimental posts with no company away, and the other eleven regiments are much less scattered than formerly. It is thus seen that the army has gained in one matter of great importance; the soldier's instruction from recruit to regimental drill can be much more systematic than formerly. We thus receive the recruit under conditions especially favorable for methodical training.

The requirements needed to make an efficient soldier are many; and no one quality would make the soldier if the others were absent; but in the enumeration of these necessary qualities who would fail to put a sound and strong body among the very first? This is the first requirement on entering the service and should not be forgotten when the recruit becomes a soldier. The gymnasium is the only place where every muscle of the body can be exercised, and it has the great advantage of being available when drills and many other military duties have to be suspended on account of cold, stormy weather.

To persons who have taken a continued course of training in a well-equipped gymnasium it is unnecessary to speak of the fine effects, not only in strengthening the muscles, but also in giving the best of health. It is then a man thoroughly appreciates how good health and good spirits go together.

When the recruit makes his first appearance at the gymnasium, he is not usually impressed with the benefits the training can give him. If he is not started in the right way he is liable to leave, feeling that if he cannot turn handsprings or do the giant-swing, there is nothing left for him to do.

The new men should be immediately set at work on the simple exercises. With the various apparatus in a gymnasium many things can be done which require neither special skill nor hardened muscles. The time for compulsory work in the gymnasium is usually thirty-five minutes for each company, and for the newest men this time could be divided between the dumb-bells, the chest weights, and the rowing machines, gradually changing to exercises which need some skill and practice. There are a large number of manuals of dumb-bell movements and almost any one of them could be used as a general guide. It will be found better in practice not to be bound down to any one book. More interest will be taken if the squad leader is encouraged to learn new exercises and thus vary the drill. A number of movements will be suggested by the setting up exercises and also by Mr. Koehler's Manual of Calisthenics.

Iron rods are as good bar bells as any others and, at a military post, can be easily obtained. Rods three and a half feet in length and weighing six pounds are the right size. These can be used by the calisthenic squads in order to vary their work. The bar bell drill is not so varied as that with the dumb-bells.

In a few weeks these men will be surprised to see how much muscle can be built up by a comparatively short amount of daily exercise. It is by no means to be implied that these simpler exercises should be dropped as the men become more proficient. These still remain among the best although the men should be constantly encouraged to use the other equipments of the gymnasium. Indian-club swinging should be taught after the recruit has been in the gymnasium a few days. These are light exercises if performed with a club of light

weight, but require a certain amount of skill which cannot be acquired immediately. There are a dozen swings which almost everybody learns in the beginning. After these are learned, it would be well for the squad leader to take up any of the more difficult swings that suggest themselves.

As the men become more proficient, they take up the gymnastic work on the horizontal bar, the ladder, the parallel bars and the other apparatus. Many of these require both skill and hardened muscles. Double timing and running are among the best exercises, but these should preferably be held in the open air if the weather is suitable.

In mentioning the different exercises, I am aware that I have dwelt principally upon those which some people would call the elementary work in a gymnasium, but these are without doubt the exercises toward which an officer should direct the attention of the company. They develop the muscles and increase the power of the lungs much better than those feats which would resemble the accomplishment of the acrobat. The endeavor of the instructor should be to instruct all the company in the lighter exercises, leaving the individual to work out his ability as a trapeze performer if he is so inclined. The mass must be trained, not the individual athletes. We are training the soldier for practical purposes, and it would avail us little less than nothing if one-third of a company in heavy training accomplished a long march leaving the other two-thirds exhausted on the road. The same reasoning would apply to an attack on a fortified position. On open ground the troops would be under the enemy's effective artillery fire when a mile and a half away. The command whose individuals could run long distances from cover to cover without losing breath would have an immense advantage; but on the other hand, the advantage would be very slight indeed, if only one-third could pass these distances in double time while others, entirely unaccustomed to vigorous exercise, were forced to move at a walk. All the members of a command cannot of course be physically equal, but the benefit derived from the gymnasium need not by any means be confined to the stronger and younger men of a company.

Agility is to be desired much more than great strength.

Laborers often possess immense strength in certain muscles and are quite frequently muscle-bound, a marked case being where the shoulder is pulled forward beyond the power of the back muscles to pull it back. More benefit is derived from swinging a light weight than a heavy one, but the exercise should be continued till the muscle is really tired. Violent exercise is good only under certain conditions and when the muscles are strong enough to bear it. Fatigue does not always mean that a muscle is being developed. If a muscle is held in a constrained position for a long time it will become very much fatigued but not strengthened.

The lighter exercises should be the compulsory ones and encouragement rather than compulsion should be extended to those men who show aptitude for the more difficult gymnastic feats and for record-breaking contests. Field day exercises and other competitive sports should receive the hearty support of every one, but we should still remember that success at these is a means and not an end. These contests are the best means in the world to keep up interest in athletics. If they are properly encouraged and the members of each company are taught the great variety of exercises which can be taken in a gymnasium, there is no danger that this kind of drill will ever become monotonous.

When a gymnasium is first established at a post, the instructor will undoubtedly find much trouble in getting the interest of men over thirty and thirty-five years of age. These men will usually think that exercises can benefit only the younger men. The instructor must not expect any important change in a week or a month, but it has been the writer's experience that after a winter's course in which these men were shown the use of suitable apparatus, the interest became general throughout the companies. Chest weights furnish one of the very best exercises. The movements can be learned in a few minutes and for building up muscle, especially in the arm, the effect is really surprising. The non-commissioned officers often belong to a class which learns slower than the younger privates. This is of course a serious drawback during the first season, but it will be gradually overcome. In the second season there will usually be enough competent non-commissioned officers in each

company who are capable of leading the squads in various exercises. It is excellent practice for the non-commissioned officers to be squad leaders. It is noted at drill, particularly during extended order, that the non-commissioned officers do not take charge of their squads in the true sense of the word. The practice in gymnasium gets them accustomed to commanding squads, a practice that they very much need. They should be held always responsible for the order and constant exercise of the men under their charge.

The officer superintending the gymnasium should lead one of the squads or be ready to lead one at any time. If he decides to be a quiet spectator, he will be surprised to find what an influential personage he is. Fully nine-tenths of every company will show a perfect willingness to follow his example. If the instructor takes the same amount of exercise as the men, he will know what exercises strain the muscles and what ones are suitable to a certain stage of training. It will sometimes happen that a man new to the work will receive a sprain in doing what other men do constantly every day. Men should be instructed to bend the knees always upon striking the floor no matter how slight the height from which they drop. Otherwise many of the new men will receive sprains which could easily be avoided.

Measurements are of great value when we take each case individually and see the beneficial effects of a moderate training, but the value of figures is in many cases lost when we attempt to sum them up and draw general conclusions. The case of the individual weight illustrates this. A healthy young man will usually gain slightly in weight while training moderately. This gain represents a great gain in muscle while there is a loss of superfluous flesh. On the other hand a man who is too stout will lose in weight and the two men together show the average weight nearly the same as before. The case is of course much different when the measurement is taken directly over a muscle or around the chest to show the amount of chest expansion. But even here, it must be admitted the knack of drawing the muscles a certain way has something to do with the figures given by the measurement. We must not expect too much change in the outward appearance. Physicians tell us that the bones of the human body never change their length after full growth has

been attained. So strictly is this true that the French identify criminals by an accurate measurement of several bones. Perhaps the best tests of improvement are the number of times a man can pull his chin up to the bar, can push himself up on the parallels, and the distance he can run with ease.

Indian-club swinging, the dumb-bells and other exercises will assist very materially in getting the shoulders back and giving an erect carriage, but we would not wish any one to think from this that the older methods of giving the soldier the setting-up drill should be discontinued. The old and the new methods should each assist, but not displace, the other.

At a college I attended we once received a very forcible object lesson to show that the gymnasium is a great help in maintaining order. Property on college grounds damaged or destroyed by students was repaired and at the end of the term the total expense was divided among all the students and charged on their term bill. One autumn a fine gymnasium was established and the students took a great interest in the exercises. The effect on good order was shown by figures as well as by observation. The president of the college remarked that the bill for repairs was the least of any term in twenty years. We were surprised to think that there was any connection between these two events of the term, but it was nevertheless very apparent. The students, and especially the more active ones, were tired when night came and the college property remained unmolested.

As officers of the army we have the problem before us to develop the recruit into the best soldier possible in time of war. Of the material given us we certainly cannot complain. To pass over other qualities, the recruit of the past few years has been the best physically that has come to any army. We have had many applicants and have been able to take our pick. One of the questions which comes before us is this, will we make him a soldier who is the better physically than the soldier of any other army? There can be but one answer to the question. The practice of military gymnastics is not a novelty. At the small garrisons in the Indian country there were many things that took its place, but these conditions are rapidly ceasing to exist. The Prussian soldier was in training before the war of

1870 and the military authorities have not hesitated to ascribe to this the great ease with which the men endured the marches and fatigues of the campaign. The great gain of better marksmanship was also one of the advantages. Assaults will usually be made by passing from one cover to the next at a very rapid pace, and the marksman or the first-class man who can fire under normal conditions will certainly beat the sharpshooter who is exhausted and out of breath.

The gymnasium course is eminently a practical course. It keeps the soldier in health and strength while he is in the service, and not only sends him out at the end of his enlistment a stronger man than when he entered, but also gives him skill in gymnasium exercises which will in many cases be kept up in after life.

Nor will athletic training be limited to time of peace. Once the system is thoroughly established in the Regular Army almost every soldier who leaves the service will be a competent squad leader and the system can be extended without difficulty to the Volunteers.

Dropped, as this practice will of course be during an active campaign, it will immediately spring up when the active season is over. It will be the best of all aids for the health and discipline of the command. It will absorb the energy of the American soldier when it will take every influence to make him rest contented under military discipline and patiently await orders for any kind of service or duty. Authorities agree that the wars of the future will be short. They will have to be. The immense number of men in the field and the great cost of armament will leave one of the nations exhausted before the war becomes prolonged. At the same time the battles will no doubt be longer and the endurance of the men, if possible, be more severely tested.

Wars will be very variable in their demands upon the soldier. A command will often be kept in one locality for a long time and then suddenly ordered to make a series of forced marches under the most trying circumstances. Who can doubt that systematic exercise will be the best way possible to keep the men contented during the period of inactivity and at the same time keep them hardened to endure the physical exertions of successive marches?

The physical training is a very important part of the soldier's education, and the present system throughout the army is but the beginning which is bound to develop until the gymnasium holds a fixed place among other military duties.

We will then feel not only that our army gets the most vigorous and the best built recruits, but also that our army has in its ranks the strongest and ablest soldiers of any army in the world.

THE MAUSER SELF-LOADING PISTOL.

By First Lieutenant FREDK. S. FOLTZ, 1st U. S. Cavalry.

THE following description is derived from information furnished personally by the inventor and maker and from a trial of the arm; also from "Mauser Selbstlader,*" by General Wille and an article by Captain Hart in *la Revue de l'Armée Belge.*†

PISTOL WITHOUT STOCK.

The pistol shown in the above illustration is due to the genius of Mr. Paul Mauser, the great German inventor and

*A handsome pamphlet with 90 illustrations in the text and two plates. Berlin, 1897. This book is a model description of a fire-arm as well as a handsome piece of printers' work. The illustrations in this article are reproductions from the pamphlet.

†"Pistolet Automatique Mauser." Capitaine Hart. *Revue de l'Armée Belge*, July-August, 1897. A thorough detailed description, fully illustrated, with mathematical demonstration, taken in part from General Wille.

maker of military rifles. It is the latest automatic weapon and it is believed that its merits will promptly win for it a wide celebrity.

The arm is now being turned out by the Waffenfabrik Mauser at Obendorf am Neckar, in Wurtemburg.

The term "self-loader" used by General Wille seems more descriptive than "repeater," "automatic arm," or any of the terms that have hitherto answered our purpose and it naturally follows in the series of progress: Muzzle-loader, breech-loader, self-loader.

The Mauser self-loader, as will be seen from the cut, is of a compact form and, the magazine being flat, the pistol can be carried on the person more conveniently than a revolver with its awkwardly projecting cylinder.

In this arm the force of the recoil opens the mechanism of the breech, ejects the empty cartridge case, cocks the hammer, introduces a new cartridge into the chamber, and closes and locks the breech; the shooter having only to aim, press the trigger, and, after ten shots, recharge the magazine.

The simplicity with which these functions are fulfilled and the substantial construction are the marked features of the system.

THE WORKING OF THE MECHANISM.

The barrel with breech-casing and breech-bolt are mounted so as to slide upon the lower half of the mechanism, which consists of the lock case, magazine and grip.

When the charge is exploded the recoil slides the upper part (barrel, etc.) to the rear for a distance of about two-tenths of an inch when the motion of the barrel and breech-casing (forming one piece) is arrested.

In this short run the recoiling barrel has however given a sufficient thrust to the hammer to throw it back to the full cock notch and the bullet has already left the muzzle.*

At the end of this run the breech-bolt is unlocked and its

* This recoil might be limited to less than one-tenth of an inch and still operate the mechanism. By experiment with a breech-bolt rigidly fastened to the breech-casing it has been demonstrated that the hammer is cocked entirely by the blow of the recoiling barrel before the unlocking of the breech.

acquired momentum carries it still father to the rear, compressing a spiral spring which serves, later, to close the action.

The empty shell, by its own momentum, follows the bolt as it slides back, and, striking a stud in its passage, is thrown out vertically.

As the bolt, in sliding to the rear, uncovers the magazine, the magazine spring raises a new cartridge into position.

The bolt having exhausted its momentum, is now returned by the reacting spiral spring to its firing position, pressing the new cartridge into the chamber, sliding the barrel and breech-casing forward to the firing position and locking the action ready to be fired by the next pressure upon the trigger.

The mechanism is such that the pressure upon the trigger must be released before the weapon can be fired anew, thus making it impossible that the whole contents of the magazine should be fired by one convulsive grip of the trigger.

LOADING CLIP.

By a happy provision the follower of the magazine rises after the the last cartridge has been delivered and holds the breech open, thus showing the shooter that he must reload, and at the same time presenting the magazine open and ready to receive its new charge.

If the firing is to be discontinued a simple pressure of the finger forces the follower down and allows the bolt to be eased forward into place.

The ten cartridges are carried in light, simple and inexpensive clips (see cut); these being symmetrical, either end is inserted in front of the breech-bolt, and the cartridges are pressed down into the magazine with the forefinger or thumb. Upon withdrawing the clip the bolt flies forward and the piece is at once ready to fire.

The time required to recharge the magazine is, thus, less, and the movements fewer and simpler than in loading one cartridge into a revolver.

To load by single cartridges without the use of the loader

(as might be necessary in an emergency), draw back the bolt, press the trigger, the hammer will then fall into such a position as to hold the bolt open. The cartridges can then be placed in the magazine, and on raising the hammer to full cock the bolt flies shut and the pistol is ready to fire.

In the magazine the cartridges are not exactly superposed, but lie alternately to the right and left, thus reducing the depth of the magazine about one-third.

The safety catch is located at the base of the hammer, on the left side, where it is easily reached by the thumb when the hand grasps the grip. A simple upward push makes the weapon ready, a pull downward makes the hammer safe and locks all parts of the action.

The firing pin is always held back within the face of the breech-bolt by a strong spiral string which is only momentarily overcome by the blow of the hammer. Owing to the form of the breech-bolt the head of the firing pin cannot be reached by the hammer until the breech is fully closed and locked.

It is to be noticed that until the bullet has left the barrel the breech remains locked, the cartridge case retains its position, there is no escape of gas, and the recoil of two-tenths of an inch is not more than would inevitably occur with any pistol in the firmest grasp. The shooting is therefore most regular, for the bullet receives the full impetus of the charge, which is not the case with revolvers where a varying amount of force is lost each time between the cylinder and barrel.

Although in actual firing the empty cartridge case is withdrawn by its own momentum of recoil, yet an extractor is provided at the end of the firing-bolt to withdraw dummy cartridges or missfires. In these cases, all that is necessary is to draw back the bolt by means of the roughened grip at its rear extremity, let it fly shut again and resume the firing.

DISMOUNTING.

To dismount the weapon, the hammer is first cocked, the bottom of the magazine is slid off by pressing upon the retaining stud with the point of a bullet or the end of a stick. The magazine spring and follower come away with the magazine bottom. With the end of a cartridge-clip, a coin or a knife,

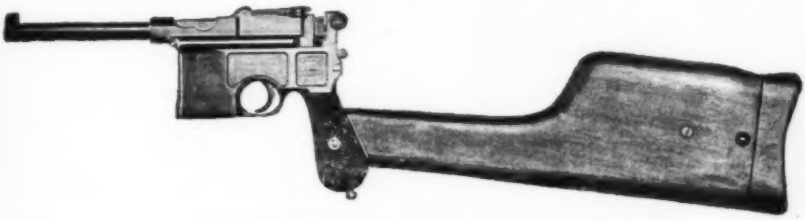
raise the catch at the back of the hammer and slide the barrel, with mechanism attached, out of the lock-case, to the rear.

The mechanism which comes away attached to the under side of the breech casing is next detached with the fingers, and the breech-bolt and firing-pin may then be dismounted by using again the point of a bullet or the end of the handle of the special cleaning-rod.

The arm will seldom have to be dismounted more completely; when necessary a special tool, not essential but convenient, is found in the handle of the cleaning-rod.

For the ordinary purposes of cleaning it is only necessary to draw back the bolt, block it back by pressing the trigger, and the barrel and magazine are then accessible.

The parts are held in place by interlocking, abutment, or on the principle of a bayonet shank; there is but one screw used



PISTOL WITH BUTT STOCK.

and as that simply secures the wooden sides to the pistol grip it need never be removed.

There are but 28 pieces in the mechanism and 12 others forming the frame, sight, etc., or 40 pieces all told. *And they are all of them large and strong.*

The arm cannot be assembled if the locking piece is left out.*

THE HOLSTER BUTT STOCK.

The pistol is provided with a walnut butt-stock instantly attachable by a sliding tennon and spring catch to the back of the grip. When not in use as a stock this butt serves as a holster, its interior being hollowed out to the shape of the pistol,

* The arm can be dismounted by a skilled man in 3 seconds and assembled in 7 seconds, provided that the mechanism is not dismounted; otherwise the complete dismounting requires 40 seconds and the reassembling 75 seconds.

CARBINE WITH BUTT.

whose grip projects about half its length outside to facilitate quick drawing.

On the inside of the hinged butt-plate that holds the pistol in the holster, is a strong spring which not only keeps the weapon motionless in the case but throws the cover wide open on the touching of a stud when the arm is to be drawn.

The leather sling of the holster is not detached when the latter is used as a butt-stock and a small thong fastened to the sling is snapped into the ring of the pistol grip as a lanyard.

VARIOUS MODELS.

Five models are offered, all using the same cartridge.

The six-loader whose magazine extends less than half-way down the front of the trigger guard.

The ten-loader—shown in the cut.

The twenty-loader whose magazine extends below the trigger guard nearly as low as the end of the pistol grip.

The light ten-loader not adapted to the butt stock, carried in a leather holster and not provided with elevating rear sight.

And lastly the carbine ten-loader with holster butt-stock as shown in this cut, differing only from the ten-loader pistol in the absence of the grip and the greater length of barrel (9½ inches).

CARTRIDGE.

The cartridge case is rimless with a recessed groove around the head for the extractor: it is slightly conical and slightly bottle-shaped.

The bullet is of hardened lead, jacketed with nickeled steel, its calibre is .30 of an inch and it weighs 85 grains. The charge is 7¾ grains of Wolff von Walsrode smokless powder.

MISCELLANEOUS DATA.

Weight of 10-loader pistol, about 2½ lbs.

Weight of 10-loader pistol, light model, about 2 lbs.

Weight of 10-loader carbine, about 4 lbs., with butt stock.

Length of barrel of pistol, about 5½ inches.

Length of barrel of carbine, about 9½ inches.

Distance between sights of pistol, about 9½ inches.

Distance between sights of carbine, about 13½ inches.

Initial velocity (pistol) about 1394 feet per second.

Remaining velocity (pistol), at 1000 metres, 377 feet per second.

Living force of bullet (pistol) at 1000 metres, 7.77 ft.-lbs.

Penetration of bullet (pistol), near the muzzle, .1 inch steel plate.

Penetration of bullet (pistol), near the muzzle, 17 inches pine.

RAPIDITY OF FIRE.

A skillful man can fire six or seven shots per second within the limit of the capacity of the magazine. Beyond this limit. when the magazine must be recharged, a very skillful man can, fire 120 unaimed or 80 aimed shots per minute.

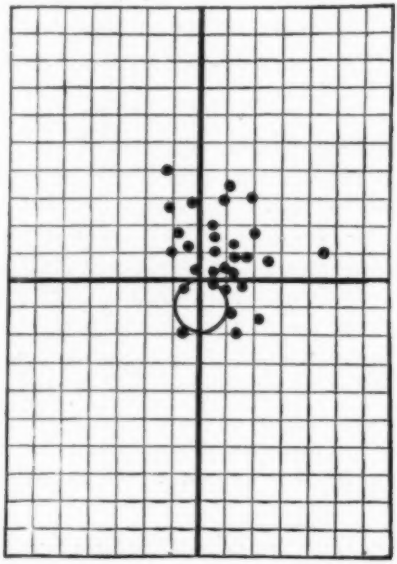
TRAJECTORY.

Aiming along the surface of the ground up to 400 metres the dangerous space includes the whole extent of the trajectory. The dangerous spaces firing from the standing position are as follows:

At a range of			400	metres—	58	metres	dangerous	space.
"	"	"	500	"	38	"	"	"
"	"	"	600	"	27	"	"	"
"	"	"	700	"	19	"	"	"
"	"	"	800	"	14	"	"	"

At a range of 900 metres—10 metres dangerous space.
" " " 1,000 " 8 " " "

The arm is sighted up to 1000 metres and its accuracy is shown by two targets, made at the factory, reproduced below:



" 30 SHOTS AT 100 METRES." MADE AT OBERNDORF. HEIGHT OF TARGET, 1 METRE; WIDTH, 70 CENTIMETRES.

ENDURANCE.

10,000 shots have been fired at different times with a single pistol with no apparent deterioration.

2200 shots were fired with another of these pistols, successively and without cleaning, the barrel being cooled after each series of 300 shots.

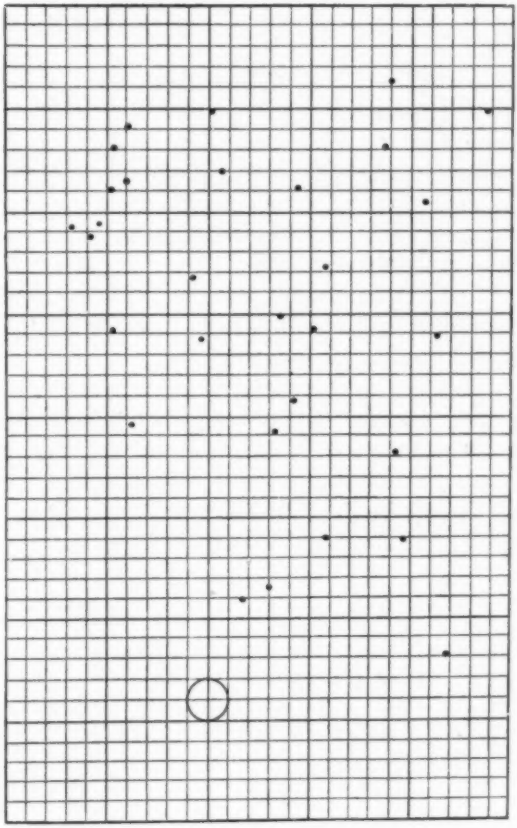
The pistol has of course also withstood the tests prescribed by law, being fired with 77 grains of black powder and a slug of lead weighing 245 grains. This slug projected beyond the muzzle and the pressure developed was 4000 atmospheres.

ADVANTAGES OF THE ARM.

Its form is such as to protect it from influences of rust and

dust. The shooter can give all his attention to his adversary and to his aim.

The magazine contains a large number of cartridges. The recharging of the magazine requires little skill and less attention (the clip being symmetrical) and the expenditure of muscular



"30 SHOTS AT 1,000 METRES" MADE AT OBERNDORF. HEIGHT OF TARGET, 8 METRES; WIDTH, 5 METRES.

strength required is very slight. These considerations as to the magazine are of special importance to the cavalryman whose pistol may hereafter be *always loaded*, a distinction heretofore monopolized by *l'arme blanche.*

As soon as the magazine is filled the piece is ready to fire without further manipulation.

When the magazine is emptied the shooter is notified by the action remaining open, ready for filling.

The safety can be operated with ease and certainty when the fingers are stiff with cold.

There is no escape of gas into the mechanism and therefore little fouling.

The piece is quickly and simply dismounted, as far as ordinary cleaning requires.

The arm cannot be assembled so as to omit a part the absence of which would injure the weapon or endanger the shooter.

The parts are few in number, they are large and strong and can be dismounted without tools.

The pistol is elegant in form, compact, well balanced, handy and has no projections to interfere with its being disposed about the person or to hamper its user in action.

Lastly, so much of the recoil is utilized in operating the mechanism that the shock is very slightly felt in the hand, and the barrel retains very nearly its original direction.

From the advance in simplicity of construction and certainty of action illustrated in this latest automatic arm it is safe to assert that the day of the self-loading rifle for infantry is already here.

September, 1897.

Reprints and Translations.

WAR WITH ARMIES OF MILLIONS.*

TRANSLATED BY CAPTAIN P. HOLLAND, 5TH PUNJAB INFANTRY.

(*From the United Service Magazine, London.*)

THE author of this pamphlet has preferred to introduce himself to the public as an "Old Soldier," several considerations having rendered it inadvisable for him to appear in a public capacity.

Having served through numerous campaigns and devoted himself life and soul to the service of his country, throughout a long military career, feelings of patriotism and a deep interest in the efficiency of the army, but at the same time in the welfare of mankind generally, have actuated him in attempting the study of the existing military conditions of the great European Powers, showing how far they are adapted to defensive requirements.

The result of this study† he now submits to the public, the main point arrived at being that both from a military and imperial point of view some considerable revolution of our military systems is urgently demanded, and this change should not take the form of disarmament so much as that of adopting another means of armament.

It need however scarcely be observed that such a change as proposed could only be brought about by statutory measures, and on a complete and entirely unanimous understanding between all the leading factors.

Without presuming that this leaflet will achieve any positive results, the author is persuaded that the time is ripe for the discussion of so momentous a question. Though doubtless any attempt "to improve the world" may be classed as an unprofitable task, the author cherishes the somewhat "ideal hope" of having performed a duty owed to his fellow creaturcs.

If, by a perusal of these lines, even a small community may be disposed to interest themselves in the question generally, the author will be satisfied that he has contributed to the many "drops that wear away the stone."

A. S.

VIENNA, Autumn, 1894.

Owing to force of circumstances, and the introduction of general conscription, the armed forces of the great European Powers have dur-

*"War with Armies of Millions": a Military Political Study, by an Old Soldier. Reprinted from the *Allgemeine Schweizer Militär Zeitung*, 1894. Translated by Captain P. Holland, 5th Punjab Infantry.

†Similar works by the same author have been consulted.

ing the last twenty-four years steadily increased, until they have now assumed dimensions that are justified neither by the general political situation nor the oft asserted desire for, and assurance of, peace.

The nations who now confront one another thus armed to the teeth are Christians; their governments are already burdened to the utmost limit, while in one instance, that of Italy, they are threatened with financial ruin.

The intense strain of military enterprise has paralyzed civilization, for war with such millions loses its elevating and civilizing effects and assumes such a horrible character that the ultimate result can be nothing less than the extermination of nations and the absolute desolation of countries.

The system of general conscription failed to achieve what was expected of it, that is, rendering the masses generally amenable to discipline and control, whilst it has rather led to an intense desire for war pervading all classes. This spirit is at once evinced when the people are discontented with the prevailing condition of things, and imagine their own interests to be menaced, or when political agitations take place. In proof of this I would merely mention the increase of Nihilism and the labor movement throughout Europe, whose operations are characterized by their excellent organization and discipline. These and similar tendencies are shown in various ways both amongst citizens and the agricultural classes, and should anything occur to rouse their slumbering passions, they would not fail to make the most of their military experience. Then again the short period of service with the colors is altogether insufficient either to imbue the citizen or peasant with a true military spirit, or to give him even a superficial education.

Hence the real moral fighting qualities of the soldier must to a certain extent depend upon the national moral standard in general, which must evolve the spirit of patriotism, loyalty, and devotion throughout all classes. The training of school and church, legislation, government institutions, literature, etc., will be responsible that these qualities exist. Then and then only can we expect to obtain really good soldiers, and then only can the short period of military training suffice. At present, however, the army alone has in a few years to accomplish what education and study have failed to achieve, with the result that nations lie sick of the disease of so-called militarism, the bastard of genuine knightly soldiery, whilst the army, except for the officers, consists nominally of soldiers, but in reality of nothing more than "carriers of arms." Is not this sufficient to convince us of the necessity for a change in our military system?

The recent turn that European politics have taken, the *rapprochement* of Germany and Russia, and Austria and France, have again turned our attention to the questions of a moderation of the military system of the Great Powers, and therefore a discussion of the subject in general is not altogether devoid of interest.

The keen competition among all nations to increase, and raise the standard of, their armies has been attended by the most astounding and almost incredible results. The following figures will show the increases made by the various Powers between the years 1869 and 1892:

Name of Country.	Number of Men.	
	1869.	1892.
France	1,350,000	4,350,000
Germany	1,300,000	4,500,000
Russia	1,100,000	4,000,000
Austria	750,000	2,500,000
Italy	730,000	1,636,000
England	450,000	602,000
Spain	550,000	800,000
Turkey	300,000	1,150,000
Switzerland	150,000	338,000
Sweden	130,000	338,000
Belgium	95,000	258,000
Portugal	70,000	154,000
Denmark	45,000	91,000
Holland	45,000	185,000
Montenegro	40,000	55,000
Greece	35,000	180,000
Roumania	38,000	280,000
Servia	25,000	180,000
Grand totals	7,203,000	21,597,000

To this we must add recent increases made or being made in Germany, France, Austria, and Russia, and which we may take as another million of men.

We quote these figures glibly enough, but as realistic facts they are scarcely credible. We must fain confess that "there *is* something new under the sun." To show what twenty-one millions of men means, an approximate calculation shows that, with complete transport, departments, etc., infantry and cavalry in file, wheeled transport singly, it would take about one year for them to march past, while the length of the column would equal that of the equator, 24,800 miles.

In order to relieve financial pressure during peace time, men are only kept for three years with the colors. A reduction of this period to two years has been proposed and carried out in some quarters. Yet military efficiency has reached a higher standard than ever. War is rough work and requires good men, whilst generalship is an art that requires, besides professional knowledge, a keen appreciation of human nature, and special natural qualifications.

Numerical strength, though a most important factor in a campaign, is not altogether unattended by a certain element of danger.

Napoleon I. said "The good God above is always with the strong

battalions," but then we must remember that his battalions were composed of well tried and seasoned men, with an excellent spirit pervading all ranks, to say nothing of the iron discipline by which they were controlled.

How do we stand as regards our modern armies? When mobilization takes place, numbers are untrained, whilst others are insufficiently so, and a large proportion of officers (those of the Reserve) have but the most elementary military knowledge. This is of course compensated for to a certain extent by their moral qualities, which again, however, exist among the men to a far less extent.

Then again, the whole of our present military service is far less severe, discipline is less enforced, punishments are insufficient, and the soldier of the present is accustomed to comparative luxury. Later on I shall endeavor to show how cogent are the reasons against entertaining such vast bodies unless controlled by a hand of iron.

Modern arms of precision and engines of destruction have still further revolutionized the armament of these hosts. Our magazine rifles now carry as far as the cannon of former days, and fire more shots per minute than the old rifle did in a quarter of an hour, while each man now carries two to three hundred cartridges on his own person. The bullets penetrate five men standing behind one another, and will splinter a bone in yet a sixth. As a consolation we are told that from a medical point of view the wounds inflicted will be "favorable." How apt are the ironical words of the poet:

"Unzivilisierte Horden
Kämpfen noch mit Schwert und Speer
Menschen die human geworden
Mit dem Repetiergewehr."

Savage tribes their battles fight
With swords and spears or such-like trifles;
"Humane" folk *only* have the right,
And wish, to use repeating rifles.

The modern breech-loading field-guns carry to an enormous distance, firing destructive projectiles with marvellous precision and rapidity, while the invention and manufacture of explosive material is one of the most serious and engrossing occupations of the present generation. Our armies are followed by siege trains with guns of greater calibre and power, to which has lately been added the howitzer with its terrible death-dealing pointed shell. Smokeless powder has now been universally adopted, and is a factor that will not only materially affect the course of an action, but will exercise an immense moral effect by lengthening the period of uncertainty and insecurity.

The progress and improvement in naval armament have also been immense. The floating monsters of the present day are armed with fewer but more powerful guns, some of which have a calibre of nearly

half a metre (1 ft. 6 in.), and are moved by hydraulic and steam power and fired by electricity. Torpedoes, submarine mines, and various other engines of war are daily being improved, each nation jealously striving to outvie the other. One is compelled to ask how it will all end. Shall we lengthen our period of service and retain fewer veterans? Verily the present outlook is somewhat gruesome, and yet no one will venture to propose a change!

Max Jähns, the well-known military writer, in that interesting and comprehensive work of his, "War, Peace, and Civilization," arrives at the same conclusion both in his introductory chapter and in his historical deductions.

"War was, is, and must ever be, one of the most potent instruments of civilization for mankind. Formerly, it was probably more so, but it must necessarily be so in future, for it is war alone that can give nations the renewed 'right' corresponding to their 'might.' Its civilizing effects must always be the same, for military training develops manly qualities that would otherwise disappear, and produces that noblest of all human virtues—'heroism.' Numbers might reasonably be reduced, for to wage war without sufficient cause only debases a nation in the eyes of the world and in history. Our military system is less severe than formerly, a matter for congratulation as long as it is not carried too far, for noble and generous natures should always be characterized by clemency. War can, however, never be dispensed with without irrevocable harm to the cause of civilization."

With the first portion of this quotation I am entirely at one, except with regard to the little word "is," in the first sentence. No, a thousand times, no, war with our modern weapon can never be a means of promoting civilization. Jähns himself seems somewhat doubtful on this point when he says that it "was" so to a greater degree. A future war will be no criterion of the real backbone of nations, and their power to defend their lawful rights in one great and common cause, to fight for all that is nearest and dearest to them on earth, and carry to a successful conclusion a campaign which would bring with it the further development and blessings of civilization. The percentage of casualties will probably be less than in many past campaigns, and men are easily replaced, but the war of the future will be no duel with foils or broadswords, but an onslaught as it were with a massive club that deals death and destruction wherever it descends.

This is what makes a soldier anxious when he looks into the future. It will no longer be the ability of a commander, the strategy of generals, the bravery and perfect training of armed men that will turn the scale, but the mere brute force of seething masses driven into battle. The widest scope must be afforded to incidental errors and chances, when incalculable evil may result from trifling causes, for it will be scarcely possible to control such immense numbers.

The times when war was a fine art, the skillful manœuvres of a

Frederic II., a Eugène, or a Napoleon are over. In 1812, the latter even failed with all his genius to solve the problem of an organized control over five to six hundred thousand men, whereas now we shall have to deal with seven or even eight times that number. Such colossal and unwieldy masses cannot be effective machines under one master hand. They will resemble rather a mass of rock detached from the mountain top, that either sweeps everything before it in its descent, or if too weak in itself, is shattered into fragments that litter the surrounding country.

The general political conditions now prevailing, all point to the probability of war, if it should break out, being a universal one. Mobilization alone will shake the very foundations of our social and commercial system. Those who are naturally nervous will be overcome by an intense and unspeakable fear. Everything down to the most minute detail has been prepared in time of peace. Every man, every official, every horse, have their own appointed places and duties, while the most exact and careful calculations have been made as regards rail transport, down to the last engine and carriage. Any trifling mishap, therefore, such as a railway accident, may entirely throw out a commander's calculations. With smaller armies these matters were not attended by such vital consequences.

The art of war will be of a new and unknown order. Existing theories based on the handling of far smaller bodies will have to be greatly modified and re-adjusted. We have nothing to guide us as to the effect of modern weapons and smokeless powder, though it may be taken as fairly certain that the general feeling of insecurity and uncertainty as regards the enemy's movements will be enormously increased. The great and intricate questions of supply and ammunition will add enormously to the responsibilities of the commander, and affect his decisions materially. The transport and general impedimenta of an army will assume enormous dimensions. The utmost forethought and care regarding medical and surgical matters will scarcely suffice to insure adequate arrangements, in spite of private assistance, which is always so nobly afforded.

Owing to the number of new factors, it would be impossible to give any adequate idea as regards the nature of a future battle. Only by pouring a continuous supply of fresh troops into the field will it be possible to maintain an obstinate front, for those who have once been under the withering fire of modern weapons, will certainly be useless if employed again on the same day. All tactical dispositions and formations must, therefore, be carried out in great depth and in as many "lines" as possible, while at the same time bringing the utmost available number of men and guns into the fighting line during the first phases of an action.

Supposing, for instance, that with our improved rifle and smokeless powder, heavy casualties commence before even the enemy's position has

been ascertained, what will the effect be at the closer ranges, for the larger the numbers the greater the necessity for keeping them together in a compact body. The consequences of defeat will be far more disastrous than was the case with smaller armies.

Do we expect our men or even our non-commissioned officers to stand the terrible moral strain of modern fire? It has always been the officers who have set the example of steadiness, even to veterans of the most Draconic discipline. If this was so in the past, how much more will it be so in the future, and herein lies a problem of the most difficult nature, for since officers must invariably lead their men, large numbers of them must be the first to fall. The disastrous consequences of a defeat are better left to the imagination. Suffice it to say that an orderly retreat will only be possible with the most careful and deliberate disposition and under the most favorable conditions. Failing these, it will be resolved into an utter rout.

As regards the element of uncertainty attending future warfare, we are often told to comfort ourselves with the thought that it will be the same for all nations alike. In my opinion, however, it is for this very reason that the game resolves itself into one of pure chance. In proportion as our armies are increased, so the after-effects of a war must increase in their intensity. We have no wish to see hundreds of thousands of dead and wounded, or crippled and sickly men, all of whom will have to be maintained at the cost of the State, thousands of families mourning and grief-stricken, millions of money expended, countries and governments ruined, Bourses swept away: "*Mais*," we are told, "*cela, c'est la guerre!*" These and innumerable other evils we would commend to the earnest consideration of those who advocate and uphold our present military systems, proclaiming them to be an ideal and noble means of promoting civilization and progress.

Let us now consider how such a war will affect the development of the human race generally, both as regards victors and vanquished. By the system of compulsory service we bring into the field all men of normal physique at their best and ripest age, in other words—forgive the somewhat drastic term—*the best human breeding material available*. The youngest, strongest, and most efficient are placed in the first line, whilst the remainder, according to their greater age and lesser efficiency are placed in the second and third lines, as represented by the Militia, Reserve, departments, etc. In short, the better the soldier, the greater risks he is exposed to, and *vice versa*. Taking the first line, those with the best moral and physical qualities are as a rule the bravest, hence the probabilities of their being hit are greater, in addition to which we must include amongst these the best officials, doctors and scientific men, etc. What a sacrifice of intellect and science! Does the State lavish its money and power in founding universities and colleges with a view to their best and most promising students entering the field as half-trained soldiers? Then again those naturally strongest are more liable to sick-

ness and epidemic disease so prevalent where large bodies are concentrated.

To sum up, the matter stands thus: The greater the moral and physical strength of those taking the field the greater the probability of their being killed, whilst the less efficient will, or are more likely to, return to their homes uninjured. The only individuals who will enjoy immunity from risk of any kind are those who are morally or physically unfit to be sent into the field, and while the campaign lasts it is upon these that the development of the future generation will depend.

It needs no exposition of involved theory to show how far-reaching the moral and material effect of a war with millions of men will be upon the human race in general, and upon the vanquished in particular. The days are over when citizens obtained news of a lost battle in the morning, went quietly about their business, and discussed the matter with their comrades over their glass of beer in the evening, remarking bravely at the end, "Well, never mind, next time we shall win."

And if the mere fact of mobilization creates such a feeling of unrest and excitement, what will happen when war has actually commenced? The whole nation will be in one continual fever of anxiety, not only with regard to the campaign generally, but owing to family ties and associations. Now we have the telegraph, telephone, and newspapers all eagerly vying with one another to transmit the "latest from the seat of war." Rumors of defeat will act on the populace with electrical effect, their human passions will be stirred to the utmost, and should the campaign end disastrously, although deep grief may at first paralyze the general community, their worst passions will have an easier outlet.

Besides the feeling of hatred and revenge towards the conqueror there must be a bitter one of exasperation towards the government and generals, and, saddest of all, towards "the sons of their own soil." They will not be spared the cruellest censure for having failed to accomplish what was expected of them, or having failed to repay the vast sacrifices made on their behalf. It then becomes a question as to whether the nation will not find some other and more substantial method of giving vent to their pent-up feelings. We need only be reminded of the terrible days of the Paris Commune; and yet, compared with the future, the Franco-German War was mere child's play.

Lastly comes the reparation of all the havoc wrought, payment of huge indemnities, reorganization of the army, etc., etc. A conquered nation will strain every nerve, while, since every possible means has already been resorted to, the enigma of a still further increase to a nation's army becomes somewhat difficult of solution! Foreign aid will doubtless be sought at any price, and thus fresh fuel will be added to the ruling passion until we commence a "national" war, or a "war of races"! Such a war, we are told, is one of the greatest and most effectual means of promoting civilization! It might with equal right be asserted that the

eruption of a volcano is most beneficial, since it fertilizes the surrounding country.

Such a war cannot be other than most injurious to a nation at large. We must all conform to the natural laws of birth, development, and decay, and since wars are the turning points or stages of a nation's existence, the more violent and forcible they are the more rapidly the process of development is completed, and the more transient as a rule are the results obtained. So much is this so that hitherto almost all great empires created by conquerors, or nations that have suddenly risen, have declined as rapidly as they rose. Instances of this are numerous, from the time of Alexander the Great down to Napoleon, as also in the history of invasions made into Europe by Asiatic hordes.

Would it not be well for us to set to work and think out some radical change in our military system, "ere we are overtaken by events, ere mankind is taught by streams of blood and human hecatombs, that it is too late"? It stands to reason of course that such a revolution would have to be simultaneous, and could only be effected by an entirely unanimous understanding amongst all the great Powers. In order to invite a discussion of the question an international congress would have to be assembled, with the premise that all political questions should be excluded.

Those initiating the movement would have to exercise the utmost care in working out the preliminary arrangements, and lastly mutual assurances of peace lasting over a specified period would be necessary in order to effect simultaneous reductions on the proposed lines.

It is interesting to inquire whether and to what extent the ground has been already prepared for such proposals, and what possible hope there is of their being accepted and carried into effect.

During the last twenty-two years of artificial peace, there have been several growing indications favorable to a scheme of this nature. The universal desire for lasting peace has been expressed not only by crowned heads and governments, but by nations themselves. Every occasion on which Regents have addressed national assemblages, has been marked by the most satisfactory assurances, whilst a general desire for peace is indicated to a marked degree in all government and legislative debates. It must be owned, however, that such expressions are as a rule followed by fresh demands for military armament, "necessary," it is stated, "for the maintenance of peace."

The most significant forms that such a general idea has yet taken, is the formation of peace societies in almost every country, whose object is the promotion of universal peace, and the settlement of all international disputes by arbitration, and although their schemes are of a somewhat utopian nature, the movement is by no means to be despised, as a meritorious step in the right direction.

In France never-failing time has already had its healing effect, and wise governments have succeeded in moderating the passionate thirst

for revenge. The generation that witnessed the calamities and humiliations of France has to a great extent died out, the few survivors being older and more moderate in their views, whilst even the republic confess that all their military and political efforts are made in the interests of peace. In view of the general national tendency to cherish ideas of revenge any movement in this direction is of special significance. I am told that there are no less than thirteen peace societies in France. Is there then not some cause for hope that this powerful and noble race would so far forego their ignominious lust for revenge, their political "vendetta," as to discuss the possibility of reducing their armaments. Let us hope that the famous words of Renan may come true, that "in four or five years, unless war breaks out, we shall probably witness a considerable reduction of our armies, and Europe will be wise once more."

It is noticeable, moreover, that even the "extremists" are more moderate. Public opinion expresses itself most clearly in opposition to harsh and immoderate writers.

Just after the young German Emperor had succeeded his father, a rumor was current to the effect that he was not disinclined to listen to proposals for disarmament; it was then stated that the monarch would become the leader of such a movement. This rumor was soon silenced, but when the "iron" Chancellor was dismissed fresh hopes were entertained that the end of the "iron age" was approaching.

But no, the system remained the same, and, so far from being modified, it was rather the reverse. Still the fact of the original rumor being started, and the later reconciliation with the Chancellor show that we must be prepared for any sudden change on the part of such an impetuous nature.

Supposing now that Germany were willing to pose as the prime mover in such a scheme. What? Germany, who has to thank her brilliant feats of arms for the recovery of her glory and splendor, whose soil is the birthplace and training ground of all the most advanced military science, the land of conscription, war's *saigner au blanc*, the breech-loader and Krupp gun, shall she now proffer a hand in the moderation of armaments? And yet such an idea is not altogether groundless. Apart from the idea that the initial move would be worthy of so illustrious and powerful a nation, it is the Germans themselves who have proved so indisputably that so long as their hearts were in the right place, it needed neither a system of exaggerated education, nor experience in the field to achieve the most brilliant victories.

Before she went to war with France, Germany enjoyed practically fifty years of peace. It was Prussia alone that availed herself of her highly developed military system during that time. Except for the wars of 1849 and 1864 and a few weeks operations against Austria in 1866, the Prussian army had not had any experience in actual warfare. It was not until after 1866 that general conscription was adopted. It was

propagated by Prussia, all the other Germanic States being well content with their undisturbed peace. And yet throughout the Franco-German War, the German troops were equally efficient in every respect. No distinction could be drawn at any of the numerous battles, sieges, etc. There was absolutely nothing that would be taken as proof of the efficacy of the "War Panegyric," or the enervating effect of a long peace.

We must therefore seek elsewhere for the reason of the German army being so efficient, than in the permeating influence of the military system throughout all classes.

It was the general intelligence, earnestness and culture of the German nation, the development of national pride by systematic historical education, that produced far more valuable and lasting qualities than the training of the barrack square or the varnish of the soldier.

The German father, the German mother, the tutor and the priest, in no less degree than the professor, the historian, Humboldt, Ranke, Dahn, it was these who took advantage of a lengthened period of peace, prepared the ground, and sowed the good seed, whence the army reaped so rich a harvest. It was the generation thus produced, who, favored with such fortune, were led so well and achieved such great triumphs.

It is obvious therefore that Germany could best afford to dispense with such a gigantic military machine. It is the efficiency and moral value of her army that stand the trial of war far more than prolific masses of soldiers. It is far more to her interest that her culture and general standard of intelligence should be raised, instead of being demoralized by endless armament and and an enthralling desire for military adventure.

In the annual report of one of the oldest Berlin mercantile firms, for 1893, a most significant paragraph occurs:

"With regard to foreign affairs, everything is peaceful. We are, however, bitterly reminded of the enormous price we are paying for the maintenance of this peace. The refusal to pass the proposed increase of the peace establishment, demanded by the combined governments, led to the dissolution of the Reichstag, on 6th May. The new Reichstag, which was opened after a bitter election contest, passed the measure, but the question as to the means of providing the necessary increase of revenue remained unsolved. The government proposals dealing with traffic and consumption excise were a source of much anxiety to the large industrial branches, who would thus find themselves confronted with customs, control regulations and other difficulties. Indeed, considerable commotion had already been caused in commercial circles generally, transactions being only undertaken at the prohibitive prices established by the taxes it was threatened to impose."

In Germany we find five peace societies, and one for the promotion of Ethic culture. Turning to Austria, a speech was delivered from the throne itself, on the occasion of the opening of the legislative assembly,

each word of which may indeed be compared to a "pearl of inestimable value." In the message sent to his people the Emperor Francis Joseph said:

"Although the difficulties and dangers of European politics are not yet passed, and all the great Powers have continued to arm incessantly, in view of the undeniably general feeling in favor of peace, there is reason to hope that so desirable an end as a universal *entente cordiale* may yet be established. May it be my good fortune, my beloved people, to bring the glad tidings to you, and that the present strain and burden, so inseparable from a peace that is menaced, may be removed."

Is not this a bright ray on the gloomy horizon? Austria has every reason to be anxious for peace. She is busily engaged in developing the internal affairs of the country, while her armaments are as limited as consistent with the political situation. Although, owing to the preoccupation of the nation in internal affairs, the peace movement does not make itself quite so apparent, there is a peace society in Vienna composed of several leading and distinguished people, among them a highly talented noblewoman.

As regards Russia, reliable accounts of Russian life and social conditions seldom reach the outer world, and therefore information regarding the tendency of the nation at large is most meagre. It may however be assumed that, generally speaking, they are not desirous of war, the Czar himself is decidedly in favor of maintaining peace, and of late years the military party have been somewhat relegated to the background. The concentration of a large army in the western provinces, and the organization of the frontier guard on a war footing, are due to continued efforts on the part of neighboring countries, and are fully explained by the fact that in such a vast empire, mobilization and concentration are far more difficult than in other countries.

Italy is fully occupied at home, and the state of her finances alone should be a powerful motive for her to remain at peace, Rome, Milan, Turin, Palermo, Venice, and Perugia all have their peace societies.

In a late encyclical issued by the Pope to the "Princes and Nations of the Earth," he wrote as follows:

"Viewing now the situation in Europe, the peace that has prevailed for so many years, exists now more in the semblance than in the reality. Mutual distrust and suspicion have compelled almost every nation to steadily increase their armaments. The inexperience of youth is no longer checked by the influence of older and wiser men, and is exposed to the danger of military life. The best and ablest men of the rising generation are lured away from business, study, and industrial and scientific pursuits, and pressed into military service. State coffers have been emptied, governments ruined, private fortunes sunk in the all-enthralling enterprise, until the maintenance of such an armed peace is scarcely tolerable. The menace to public peace and security is now an accepted fact, and its tendency to increase is shown by constant outrages.

Secret societies are formed with the object of overthrowing everything of the nature of established government. Whatever be the form of government, if it be recognized that the authority of God alone is supreme, then only will the people gain wisdom, and accept the fact that one portion has the right to command, and that it is the duty of the other to obey. Princes and statesmen we would specially urge to reflect upon our advice, that by their wisdom, and regard for the welfare of their countries, they may use their influence and authority to a good end. Should only partial success crown their efforts, its value will be felt when the universe is convulsed, and when discontent with the present is accompanied by dread for the future. At the close of last century Europe was shattered and disintegrated by the terrible convulsions throughout the land. Shall not the closing century stand as an example to posterity of peaceful harmony, and of a universal desire to attain the blessings promised by unity of faith?"

Great Britain is still content to fill the ranks of her army with volunteers, having refused to accept the system of general conscription. Yet who will deny the abilities and sterling qualities of the English nation? Not only has she retained her position among other nations, but she has surpassed many of them in the advance of civilization, whilst both her glory and prestige are greater than those of any other country in the world. Yet all this has been accomplished without universal military training, without this feverish desire for military enterprise. It is but the natural result of healthy home and school training, in which physical exercises and manly sports take such a prominent part. The same causes have affected the rise and progress of the United States.

Some remarks lately made by King Christian of Denmark when receiving a Spanish statesman are worthy of reproduction. Although the speech was since contradicted, it is worthy of note that such ideas do actually exist and are published by the leading journals of the day:

"I hope that I may live to see Europe on a fair way to military retrenchment, and that her rulers may take steps to prevent their people being continually overburdened by increased armaments. My beloved son-in-law, the Czar, whose mission is one of peace, is quite ready to take the lead, while my old and dear friend the Austrian Emperor is equally disposed to exert his influence in this direction. I have never discussed the question with the German Emperor, because a young ruler is naturally disposed to entertain extravagant dreams of fresh laurels. I am however convinced that the King of Italy would favor a discussion of the question of alleviating the strain of our military systems, whilst as regards you, the great princess who now watches over the Spanish throne has, by her open *rapprochement* with France, shown her one desire to be the maintenance of that lasting peace so sorely needed by your nation. I am therefore satisfied that Russia, Spain, Austria, and Italy are unanimous in their desire to see their peoples freed if only to a certain degree from the oppression under which they now labor."

All this then is favorable to my argument that what is needed is not so much an effort to establish universal peace, as general military retrenchments. It is the monarchs and statesmen of the present day that are responsible. What a great and glorious opportunity is afforded them, to initiate a change and promote the blessings that would accompany it. Will they not be roused to action by the thought that in the next great war, their millions of men, the flower of their nations may return with ranks decimated, both countries victors and vanquished running blood; and all for nothing, all for a mere political phantom, all because men say that it *must* be so, when it could so easily be otherwise.

I have perhaps now collected material enough to show that our present military systems are overwrought, that they are but the diseased outcome of the *si vis pacem para bellum* notion, and must end disastrously for all concerned, in short, that a radical change of some kind is most urgently needed. Let us now consider how such a change could be effected.

The problem is indeed so difficult, and the causes militating against its accomplishment so far-reaching, that any attempt at its solution would be worthy of the application of all the available wisdom and intelligence of Europe. No more fitting subject for a prize essay could be found, and a million of money would indeed be a poor reward to the successful candidate.

The Shibboleth which pervades our whole existence, the well worn theme, *j'y suis, j'y reste*, with its many various applications will alone be difficult to overcome. It is so often asserted that to change the spirit of the day is impossible, more especially in matters depending on the will of mankind.

And yet I am by no means alone in my theory. Similar ideas have been frequently ventilated and that too quite recently. I would invite special attention to a work by Schulz Bodmer, which appeared in 1859 and was dedicated to the Prussian privy councillor Christian Carl Josias von Bunsen. Its tendency may be seen from its title, "The Rescue of Society from the dangers of Military Government." Matters have however so changed since those days that further reference to the work is scarcely necessary. Among further efforts in the direction of peace and disarmament, may be mentioned those of the deputy Virchow in Berlin in 1869, and the deputy Fischoff in Vienna in 1876, Prince Peter of Oldenburg in St. Petersburg in 1878, and lastly the German deputy von Buhler in his proposals submitted to the Reichstag and in a memorial submitted to Bismarck. To this memorial the Prince wrote the following reply (see *Max Jähns*, p. 339):

"The business of the present unfortunately prevents me from entering upon a discussion of a future which I fear neither of us will live to see. Neither I nor any other German Chancellor could possibly undertake the responsibility of such suggestions for our Fatherland, which must always maintain a defensive attitude, until our neighbors have been induced to accept your views. Even then I fear that the mutual

control of one nation over the other as regards armament, must always be a matter of difficulty and uncertainty. The formation of a senate to effectually administer this control would be an exceedingly difficult matter."

Apart from the gentle sarcasm underlying these words, considering the persons concerned and in view of the situation at that time, the reply was as favorable as could be expected. It contained no definite rejection of the principle or disavowal of the project, and yet the Prince never hesitated to express himselt in the plainest possible terms. He preferred rather to relegate the matter to the future. Fourteen years have passed since then, and everything is more than ever in favor of revolutionizing our present military systems, considering that the reasons for upholding them have proved idle, and the ploughshare stands less used and more likely to rust than ever.

The primary condition of any project such as I have suggested would be that all "professional" soldiers, and therefore all officers, should be left as they are. No army can have too many officers. If it be objected that there are too few rifles, let us arm our subalterns with light carbines or some similar weapon. Then, again, any change in actual organization should be avoided, our efforts being mainly restricted to the adoption of a system of recruiting by which exaggerated numbers and the spread of this intense military spirit might be eliminated. A simple and effective remedy might be an agreement between the Powers to reduce the total period of service as much as possible, whilst raising that of active service. Thus better trained soldiers would be obtained, whilst their numbers were reduced. Or the number of those liable to service might be reduced by one third or even one half. Those liable might be drawn into three groups, of which one would again be submitted for drawing, and from these those actually liable would again be drawn. Both systems offer the great advantage of supplying that most necessary "control" referred to by Prince Bismarck; for we may rest assured that the people themselves will insure the legal conditions in full, and will take care that not a single man is enlisted beyond the limit made by law.

Neither method would, however, be scarcely more than palliative, and the only real radical change could be brought about by the adoption of an entirely new military system.

Although, perhaps, it is beyond the scope of the greatest genius to evolve a system answering all requirements, the one most compatible with civilization, humanity, and justice, would seem to me to be one that dispenses with compulsory and depends entirely upon voluntary service. Such an army would consist of "professional" soldiers serving for a lifetime, or, at all events, some considerable period, and its general efficiency would be raised by the nature of their allegiance and obligation. The British army is formed on this principle, and yet it is Great Britain who "rules the waves," and whose territories are more than

twice the size of all Europe. Success, therefore, speaks volumes for such a system, although, of course, the results are not so clearly demonstrated and the display is not so magnificent as under the system of general conscription.

On the Continent the volunteer system has, generally speaking, no supporters. One is inclined to underrate the value of the British soldier, whilst those who argue that they have never had to fight against anything but uncivilized and badly-armed savages forget the days of "Hochstädt" and "Waterloo." It is further objected that the English soldier lacks discipline and is looked down upon by the people. All that is required, however, is to improve the discipline and raise the status of the soldier. Expensive the system undoubtedly would be, but herein lies an additional safeguard against the maintenance of an exaggerated army.

Lieut.-Colonel Hermann Vogt, in his "Armies of the Present Day," says: "The great drawback in the organization of the English army is the impossibility of any great expansion in the event of war."

I am rather of opinion that therein lies the blessing of such a system, in that an "army of millions" is thus avoided. Moreover Great Britain's army now consists of over 200,000 men. Whatever the arguments adduced against a system of voluntary service, there is no denying the fact that the principles on which it is based are ideal ones. Such an army is composed not of peace-loving citizens pressed into service, but of men whose heart and soul is in their profession, who serve from pure love of soldiering and of their country, and lastly men who have adopted the profession as a means of livelihood and business. Surely we may reasonably expect—nay, more, insist—that such men will be more efficient than recruits who are forcibly driven into the ranks and forced to bear arms.

In the foregoing pages I have attempted to show how a desire for war and general strife is evinced throughout all classes, and that such a spirit is entirely due to the continuous strain of military enterprise; how such armies of millions tend to accentuate a situation in which wars will assume a character threatening the very existence of nations, involving enormous loss and expenditure; that the outbreak of war depends upon the will or personal influence of individuals, and yet is by no means justified by political circumstances in these advanced days of civilization; how, lulled by the treacherous assurance of peace, we refuse to acknowledge the danger that is so imminent, or make any attempt to remove the root of the evil, namely, our gigantic armed hosts; how, on the other hand, armies are certainly a necessity, but that their organization should be based on principles of justice to mankind, and that all immoderate expansion should be avoided; and lastly, how there actually exists a tendency to change these matters, and that it merely requires a genuine initial step towards a realization of such expectations. The method itself is irrelevant to the matter. I have merely ventured

to suggest a way of commencement. Let us hope there are other and shorter roads to success.

In conclusion I will draw attention to a speech recently delivered by the Minister for National Defense, in the Austrian parliament, with reference to a proposed scheme of disarmament: "It is not for us professional soldiers to urge this immoderate military expansion. The universal increase to armaments betokens a disease of the present age, for which we in Austria are least of all competent to apply the remedy. We are certainly not the leaders of the movement, and, from a monarchical point of view, a termination of the endless burden would be only too welcome. Whether it is possible to solve this, the most intricate problem of the present day, I cannot say, for it depends so much upon with what prospects of success any definite action would be taken. No nation would be tempted to take the initiative without some reasonable hope of its efforts being rewarded. Any country or monarch who attempts its solution with success will have done immortal service to the world at large, will justly claim the undying gratitude of mankind generally, and rank as the true 'pioneer of civilization.'"

While these pages were going to press, events have occurred in Europe, that have thrown a brilliant light on the present situation.

A few years ago the sudden and unaccountable dismissal of Prince Bismarck caused universal astonishment, while still more recently another surprise has come in the shape of the equally unexpected dismissal of Count Caprivi. Another and apparently trivial matter has caused a great sensation, namely, the arrest and trial of one hundred and eighty-four senior non-commissioned officers at an artillery college in Prussia, on account of their having shown signs of insubordination. All evidence of that extraordinary energy and determination so characteristic of the German emperor.

With clouds on the political horizon, is it not possible that the lightning flash may descend and strike the smoldering heap when we least expect it? The power and extent of human and natural forces are often impossible to gauge, and an unknown danger is the greatest danger.

The great monarch, Alexander III., in the prime of his life, and though of herculean constitution, has succumbed to a malignant disease, amidst widespread and universal sorrow and sympathy, for he was universally honored as the "guardian of peace." It was even said that he alone had maintained the present long and glorious peace. The hearts of nations must be full of a constant dread of war, if they evince such deep gratitude for the maintenance of a peace, for the disturbance of which there was absolutely no valid reason.

When the young Czar came to the throne all Europe waited breathlessly to hear whether he would continue in his father's footsteps, the most trifling evidence of such tendencies being made a subject of universal rejoicing. In France the expression of grief at the Czar's death assumed a most demonstrative form, the temporary revival of "La

Revanche" showing that in France the spirit of fanaticism is still to the fore. The Triple Alliance is so powerful that France is forced to seek a counter-alliance with Russia, and there are even now signs that such is within the range of possibility.

All recent events, in short, though in themselves of a personal nature, have sufficed to create a feeling of uneasiness throughout Europe, showing on what hollow ground politics now stand, and how near we are to the bursting of the storm.

The well-known saying, *Nous dansons sur un volcan*, is scarcely applicable here, for the people themselves are calm and yearning for peace. The European situation may be rather likened to an immense rock, which, as an obstruction to navigation, has to be removed by the latest and most powerful explosives. The mines are laid and filled, and the electric current joined; a slight pressure and the rock will be shattered into fragments. For the explosive materials we have our gigantic armies; for the electric current, our telegraph wires; while there are three "handles" that may set the battery working, one in Petersburg, one in Berlin, and a third in Paris.

When it comes, the explosion will be terrific, with this difference: that whereas the rock would merely be removed to the benefit of navigation, in this case civilized countries will be crushed and shattered by what is known as a "national war to the knife."

Let us realize the truth, let us once recognize the absolute necessity of some radical change, and then we shall find the means to the end. Those whom it chiefly behooves to lead the way in so vital and international a question are our legislative assemblies and national representatives.

CAVALRY AND THE ARTILLERY DUEL.

Translated from the Russian Artillery Journal.

By Major E. A. LAMBART, R.A.

(*From the Proceedings Royal Artillery Institution.*)

A WRITER in the *Russian Artillery Journal*, in an article entitled "Artillery questions of the day," lays stress on the possible action of cavalry in the preliminary stages of the artillery duel in a general action. It does not appear from a study of the latest cavalry and artillery drill-books of our service that this has hitherto been much considered by either arms.

The following are extracts from the article referred to:—

"1.—The principle of modern tactics, that as large a force of artillery as possible should be employed at the commencement of a battle to prepare the way for the infantry, entails many difficulties on the

former arm as regards the deployment of the long line of guns in the selected position and calls for carefully thought-out measures of protection for the artillery at this period of an action.

"2.—The preliminary stages of an action will necessarily be fought principally by artillery of long range and cavalry as the arm of rapid, daring tactics.

"3.—It would be difficult to find better opportunities for bold action on the part of cavalry, even in small bodies, than the preparatory deployment of artillery masses, and we must therefore expect at this period desperate attacks from that arm.

"4.—At the time of its deployment artillery is deprived of all independence of action and loses entirely its power of self-defense. Especially in cases when the enemy, having previously occupied a defensive position, is beforehand with us in his deployment, daring, but not necessarily very risky, attacks of cavalry, supported by flank attacks of small bodies of infantry, may have disastrous effects for our artillery.

"5.—That the Germans, in 1870 were able, without any particular precautions, to develop long lines of guns successfully must be attributed to want of enterprise on the part of the French cavalry and we must not expect similar immunity in future.

"6.—To the deployment of artillery masses is peculiarly applicable the maxim of Napoleon: 'In war nothing can be done without calculation; nothing that is not thought out in the most minute details can be relied on with certainty to produce results.' This deployment is a very complicated matter, requiring much forethought and practice in peace time. Not only must the flanks of the line be protected by fairly strong bodies of cavalry and infantry, but the whole front must be covered by a strong line of skirmishers.

"7.—As the enemy at this period will not be in a position to employ very large masses of troops against us, the defense of our artillery line need not be of great strength, but it is important that there should be no unprotected gaps in it. Infantry, on account of its slowness of movement, would delay the deployment and, therefore, it is better to use cavalry skirmishers along the front, though they have less power of fire defense.

"8.—The artillery will be guilty of criminal neglect if in its tactics of the present day sufficient care is not taken to effectually protect the deployment of long lines of guns."

The "Field Artillery Drill of 1896" says in various places: "On leaving the line of march to advance into action a short halt will usually be necessary in order to collect the batteries.

"The formation will be in line of battery columns.

"When all, or nearly all, the available artillery has arrived, the whole of the batteries will advance simultaneously to a previously selected position within medium range."

Vol. II. of the "Cavalry Drill, 1896":

"The sphere of action of cavalry (in battle) will always be on one or both flanks.

"The cavalry taking up a position beyond the flanks of a line of battle."

The "Infantry Drill of 1896" says: "Artillery when covering the advance at long ranges is, as a rule, sufficiently protected and requires no escort."

Presumably in the artillery duel, treating of one army corps at our own establishment, 17 batteries would be engaged, occupying at least 2200 yards of frontage, even if formed in a continuous line.

The "Infantry Drill," p. 147, gives the frontage of an army corps formed for attack as 1½ miles, or 2600 yards, and it is probable that, unless the ground was exceptionally favorable or the guns formed in tiers, the batteries would occupy fully that space.

As a rule there is no difficulty in recognizing approximately the positions which hostile artillery will take up for their first and greatest effort, the artillery duel.

These positions, according to the "Infantry Drill" (p. 116), are covered by the infantry of the advanced guard at a distance of from ¼ to ½ a mile.

The preparation for action of so large a force—viz., the interval of time between the batteries leaving their respective columns and the advance into position of the whole mass—would hardly occupy much less than an hour, allowing for the distribution of orders, detailing targets, etc.

During this time the various brigade divisions would be; some waiting in line of battery columns for orders, some moving into this formation from the line of march, some deployed perhaps behind the crest of their position; all of them a considerable distance in front of their main infantry bodies and none of them certainly prepared for sudden action against cavalry the other side of the crest.

Their own cavalry, after the preliminary action of large or small bodies with the cavalry of the enemy, would be drawn off to one or both flanks. Practically the whole defense of the artillery at this time would rest on the infantry of the advanced guard or guards.

It is the period of inaction of the artillery, one might almost say of confusion (for brigade division and battery commanders would, many of them, be separated from the batteries, engaged in reconnoitring or receiving orders), that the Russian writer considers so full of danger to the artillery from unexpected and determined attacks of cavalry, even in small bodies.

The line of infantry defense in front must necessarily be thin and scattered; the rapid advance of small bodies of cavalry is often concealed and the front of artillery is a very long one.

The eventual fate of cavalry making such attacks, if once they reach the artillery position, is of small moment compared to the damage they could do.

The batteries would offer an easy prey to the cavalry wheeling right and left along the position, for the guns could not fire in self-defense without danger to their own side and the main infantry columns in rear would be similarly impeded.

It is to be regretted that even at our largest camp of instruction, Aldershot, there are no opportunities in our army of practicing the employment of large masses of artillery in conjunction with a due proportion of other arms. It is true that on more than one occasion the artillery of an army corps (17 batteries) has been collected there during the drill season, but these must necessarily be divided between the two sides at a field-day.

But it has been easy enough, even with such limited opportunities and forces, to learn how many problems there are connected with the new tactical law of employing artillery in masses.

The due protection of the batteries during the deployment seems to be one of these and one worthy the attention, from the opposite point of view, of our cavalry brethren.

RELATIVE EFFICIENCY OF INFANTRY AND ARTILLERY FIRE.—GERMAN OPINIONS AS TO THEIR THEORETICAL VALUE.

(*Translated from the Revue d'Artillerie.*)

By Lieut. W. C. RAFFERTY, 1st U. S. Artillery.

(*Continued from* Journal *No. 89.*)

EFFECTS OF INFANTRY FIRE. NUMBER OF FILES TOUCHED.

We have been engaged up to the present in considering the percentage of bullets which will reach the target, but this percentage does not represent at all the efficiency of the fire. What must be known, what is really interesting to know, is the number of files touched, because this number clearly expresses the losses to which the enemy is subjected.

When the fire is well distributed, that is to say when the sheaf of bullets covers uniformly the whole front of the objective, there exists a mathematical ratio between the total number of bullets which reach the objective and the number of files touched. If this ratio is not obtained, it is because the hypothetical distribution has not been made. The method which General Rohne indicates for finding this ratio is perfectly simple and exact, and we can do no better than to indicate it here.

Let us suppose that the target contains N files and that at each shot

or salvo there is a number of files touched equal to $\frac{1}{p}$ of the total number of files. The number of files touched at each shot or salvo will be $\frac{N}{p}$ and the number of those who will not be touched will be $N\ (1-\frac{1}{p})$. The second shot or the second salvo will give the number of files touched equal to $N\,(1-\frac{1}{p})\,\frac{1}{p}$ and the number of files remaining after this second file will be $N\,(1-\frac{1}{p})^2$. Thus after n shots or n salvos there will remain $N(1-\frac{1}{p})^n$ files intact. The total number of files touched by these n shots will therefore be $N\,[1-(1-\frac{1}{p})^n]$. Let us suppose now that at each fire there is only one file touched; the n fires will give n files touched, but the same file might be touched several times. Besides we will have $p = N$. So if we call F the real number of files touched by the n hits, we will have

$$F = N\,[1-(1-\frac{1}{N})^n] = N\,[1-(\frac{N-1}{N})^n]$$

whence $\frac{F}{N} = 1-\left\{\frac{N-1}{N}\right\}^n$ By making $N = 100$, we will have $\frac{F}{100}$ equals $1-0.99^n$ whence $n = \dfrac{\log\,(1-\frac{F}{100})}{\log\,0.99}$.

By giving F successively all values from 1 to 100 we can calculate for each value of F the number n of hits which the target must receive, or what is preferable the number $\frac{n}{100}$ of hits which each file must receive in order that there may be $\frac{F}{100}$ files touched in the whole target.

The table following gives the results thus oblained; but it must be remembered that we can use this table only when the files composing the target have equal vulnerable surfaces and when the fire has been uniformly distributed,

A line of skirmishers standing, having a density of one man to the metre, comprising 120 men, has for example been hit by eighty bullets; each skirmisher has thus received $80/120 = 0.67$ hits. Table IX shows that 0.67 hits per man gives 49 per cent. of the files touched; the line of skirmishers will therefore have lost $0.49 \times 120 = 58.8$ or 59 men.

Rapidity of Fire.—The third element which must be introduced in calculating the efficiency, is the rapidity of fire, the importance of which need not be demonstrated. It is not a question on the field of battle of

producing an effect with the least possible ammunition, but it is necessary furthermore that this result should be obtained in a minimum time. It seems superfluous to insist upon this truth, which is moreover disputed by no one.

TABLE IX.

Probable per cent. of files touched. n=number of hits per file. F=per cent. of files touched.

F.	*n.*	F.	*n.*	F.	*n.*	F.	*n.*
1	0.01	26	0.30	51	0.71	76	1.42
2	0.02	27	0.31	52	0.73	77	1.46
3	0.03	28	0.33	53	0.75	78	1.51
4	0.04	29	0.34	54	0.77	79	1.55
5	0.05	30	0.35	55	0.79	80	1.60
6	0.06	31	0.37	56	0.82	81	1.65
7	0.07	32	0.38	57	0.84	82	1.72
8	0.08	33	0.40	58	0.86	83	1.76
9	0.09	34	0.41	59	0.89	84	1.82
10	0.10	35	0.43	60	0.92	85	1.89
11	0.12	36	0.44	61	0.94	86	1.96
12	0.13	37	0.46	62	0.96	87	2.03
13	0.14	38	0.48	63	0.99	88	2.11
14	0.15	39	0.49	64	1.02	89	2.20
15	0.16	40	0.51	65	1.04	90	2.29
16	0.17	41	0.525	66	1.07	91	2.40
17	0.19	42	0.54	67	1.10	92	2.51
18	0.20	43	0.56	68	1.13	93	2.65
19	0.21	44	0.58	69	1.165	94	2.80
20	0.22	45	0.595	70	1.20	95	2.98
21	0.23	46	0.61	71	1.23	96	3.20
22	0.25	47	0.63	72	1.27	97	3.49
23	0.26	48	0.65	73	1.30	98	3.89
24	0.27	49	0.67	74	1.34	99	4.58
25	0.29	50	0.69	75	1.38	100	∞

General Rohne admits that most men can easily reach the following rapidity in firing:

Up to 400 metres..	5 shots per minute.
400 to 700 m.	4 to 5 shots "
700 to 1000 m.	3 to 4 " "
1000 to 1300 m.	2 to 3 " "
1300 to 1500 m.	1 to 2 " "
Above 1500 m.	1 " "

These figures are not exaggerated and seem to us very acceptable. For greater definiteness, we have adopted the following rapidities in the calculation which remain to be made:

Below 400 metres	5 shots per minute.
From 400 to 600 m.	4.5 " " "
" 600 to 800 m.	4 " " "
" 800 to 1000 m.	3.5 " " "
" 1000 to 1200 m.	3 " " "

But these rapidities relate to individual fire; for collective fire we must suppose the rate of fire a little greater.

Up to 600 metres	8 shots per minute.
800 "	6 " " "
1200 "	5 " " "
1400 "	4 " " "
1600 "	3 " " "
2000 "	2 " " "

Finally, for rapid fire it seems that a rapidity of ten shots per minute for all ranges may be accepted, but with this restriction, that the fire can scarcely be maintained for more than one minute at the longest.

Calculation of the Useful Effect of Fire.—Knowing the rapidity, we can calculate now the useful effect of fire, that is to say the number of files who will be put *hors de combat* by 100 men in one minute. To make this calculation, we must first know the total number of bullets which will reach the target. This number is given from the following table, calculated by multiplying the per cent. of Table IV. by the number of shots fired in one minute.

TABLE X.

Number of bullets which the objective will receive when fired at by 100 men for one minute, the range being supposed known.

Ranges. M.	Number of Shots per minute.	Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.	Artillery.
		1. INDIVIDUAL FIRE.				
300	5	136.5	103.5	56.5	220.5	
400	5	110.5	83.5	43.5	205.5	
500	4.5	86.0	62.5	32.8	171.4	
600	4.5	74.7	53.5	27.4	158.4	
700	4	59.2	42.4	21.4	126.4	
800	4	52.8	34.0	18.8	113.2	
		2. COLLECTIVE FIRE.				
300	8	128.8	100.8	48.8	284.0	
400	8	101.6	72.8	37.6	220.8	
500	7.5	81.0	57.0	29.2	175.5	
600	7.5	69.7	48.7	25.5	174.2	
700	7	57.4	40.6	21.0	128.1	
800	6	43.8	30.0	15.6	95.4	21.9

2. COLLECTIVE FIRE.—CONTINUED.

Ranges. M.	Number of shots per minute.	Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.	Artillery.
900	5.5	36.3	25.3	13.2	79.7	18.1
1000	5.5	33.0	21.4	11.5	70.4	16.5
1100	5	27.5	18.5	9.5	62.5	13.7
1200	5	25.0	17.0	8.5	54.0	12.5
1300	4.5	19.8	13.5	6.7	42.7	9.9
1400	4	15.2	10.4	5.2	35.2	7.6
1500	3.5	11.9	8.0	3.8	27.6	5.9
1600	3	9.0	6.3	3.0	21.3	4.5
1700	2.5	6.5	4.5	2.0	15.2	3.3
1800	2.5	5.7	3.7	1.7	13.2	2.8
1900	2	3.8	2.4	1.2	8.8	1.9
2000	2	3.0	2.0	1.0	8.0	1.5

3. RAPID FIRE.

100	10	216			410	
200		123			375	
300		88			216	
400		69			153	
500		59			127	
600		52			112	
700		47			103	
800		41			86	20.5

If the range is unknown the numbers of Table VIII are multiplied by the rapidity of the fire.

TABLE XI.

Number of balls which the objective will receive when fired at by 100 men for one minute, the range supposed unknown.

Ranges. M.	Number of shots per minute.	Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.
300	5.0	119.0	57.0	17.0	214.0
400	5.0	87.5	39.5	11.5	178.0
500	4.5	54.3	24.3	6.7	118.3
600	4.5	39.1	17.1	4.9	85.5
700	4.0	25.2	11.2	3.2	56.0
800	4.0	20.0	8.0	2.4	40.0

For greater distances, take half the number given in Table X.

DIFFERENT APPLICATIONS.

We can now proceed to a consideration of the useful effect, and readily solve problems of the nature of which we are about to indicate.

1. What effect will be produced by the fire of a company of 200 men firing at 600 metres against a line of 200 skirmishers kneeling of a density of one man per metre, the company firing at will for a minute and a half and the range being supposed known?

At 600 metres in one minute 100 men by individual fire at known range obtain against skirmishers kneeling 48.7 hits. The company of 200 men will obtain in a minute and a half $1.5 \times 2 \times 48.7 = 146.1$ hits or 0.75 hits per file. From Table IX, this corresponds to 53 per cent. of files touched. The enemy's line will therefore lose 53 per cent. of its strength, or 106 men.

2. An infantry detachment is fighting at 1200 metres against a battery of artillery and is using salvo fire with sights in echelon. At the end of five minutes the battery has lost half its strength. What is the strength of the detachment of infantry?

In order that the battery should have lost half of its personnel (47 men), it was necessary that each file should receive 0.69 hits. The total number of hits for the whole battery must therefore have been $47 \times 0.69 = 32.4$ hits in five minutes. It will therefore receive $32.4/5 = 6.5$ bullets in one minute. Now, at 1200 metres in salvo fire, at unknown range, 100 skirmishers obtain 6.2 hits per minute. To obtain 6.5 hits it will be necessary to place in line 105 men.

Importance of the consideration of useful effect in drawing up tactical themes.

General Rohne remarks with reason that the consideration of the useful effect should always be used as a basis for drawing up exercises to be executed by infantry fire, so as to simulate as nearly as possible the conditions existing on the field of battle. This is how this general officer expresses himself:

"It is of very great importance not only for the instruction of officers, but also for a rational appreciation of the effect of fire to clearly state the problem to be solved; this is not always done. It frequently happens that a certain number of cartridges is given to men to be fired against a designated target. There is no such problem as this upon the field of battle, for then the number of cartridges expended plays a less important rôle than the duration of the fire. It is not a question of obtaining high percentage but of causing serious losses to the enemy in a very short time.

"It is therefore necessary before drawing up an exercise to calculate the number of cartridges and the approximate time necessary to obtain the desired result, that is to say to reduce the enemy to silence."

The data referred to by the General, number of cartridges and duration of fire, are easy to determine.

Number of Cartridges.—Let us suppose first that the objective has the same length and density as the unit which it is called upon to oppose. If against a given objective, we can hope to obtain p per cent. of hits, it will be necessary to fire $100/p$ shots to obtain one hit. To obtain n it will be necessary to have number of cartridges equal to n/p.

This per cent. p belongs to a certain density taken as unity. For a line of skirmishers, it will be, for example, what we have have already taken, that is to say, one man to the running metre. If the density changes and becomes equal to d, the per cent. will become $p\,d$ and the number of cartridges to obtain n hits will be $100\ n/p\,d$. Thus at 400 metres against a line of skirmishers lying down ($d=1$), the probable number of hits in collective fire is 4.7 per 100. It will require then $\frac{100}{4.7}$ shots to obtain one hit. To obtain 50 hits for example, it will be necessary to fire $50\times100\div4.7=1064$ cartridges. If the interval between the skirmishers is only 0.75 c. the density becomes equal to 1.33 and the number of cartridges to be fired falls to $1064\div1.33=800$.

If instead of taking for the basis of calculation the number n of hits, we should take the number F of files touched, we prove the remarkable fact that the formula giving the number of cartridges to be fired is independent of the density of the target.

In fact, let us see how many cartridges it would be necessary to fire at the distance D, against the line of skirmishers of density d and length l to put $F\div100$ files *hors de combat*. To this number $F\div100$ corresponds in Table IX to a certain number n hits per file. At the distance D on a line of density equal to 1, we can hope to obtain a percentage of hits equal to p, and a number of cartridges to be fired to obtain this per cent. will be $\frac{100\times n\ l}{p}$.

In this case in fact the target contains 1 file. If the density becomes equal to d, the probable per cent. of hits is $p\,d$ and the number of files $l\,d$, so that the product $100\ n\ l\div p$ does not change; it depends only on the length l of the objective.

Duration of Fire:

If we divide the number of cartridges to be fired by the number c of cartridges which can be fired by 100 men in one minute, we will obtain the number of minutes during which these 100 men must fire in order to put $F\div100$ files *hors de combat*; in a target whose length is l. Let us suppose $l=100$ and $F\div100=0.45$. We have then from Table IX, $n=0.60$ and the number of minutes required will be

$$M=\frac{60\times100}{p\,c}$$

This formula applied to different ranges and to different kinds of fire, gives the following results:

TABLE XII.

Time during which 100 skirmishers must fire against a line 100 metres long or against a battery served by 47 men, in order to put 45 per cent. of its effective *hors de combat*.

Ranges M.	No. of shots per man per minute.	Skirmishers standing.		Skirmishers kneeling.		Skirmishers lying down.		Cavalry.		Artillery.	
		Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.
					1. INDIVIDUAL FIRE.						
300	5	0	27	0	35	1	4	0	17		
400	5	0	33	0	44	1	23	0	18		
500	4.5	0	42	0	58	1	50	0	21		
600	4.5	0	49	1	8	2	12	0	23		
700	4.0	1	1	1	25	2	49	0	29		
800	4.0	1	9	1	46	3	12	0	32		
					2. COLLECTIVE FIRE.						
300	8	0	28	0	36	1	14	0	13		
400	8	0	37	0	50	1	36	0	17		
500	7.5	0	45	1	04	2	4	0	21		
600	7.5	0	52	1	14	2	22	0	21		
700	7	1	3	1	29	2	52	0	29		
800	6	1	23	2	0	3	51	0	38	2	5
900	5.5	1	40	2	23	4	33	0	46	2	29
1000	5.5	1	49	2	49	5	14	0	52	2	44
1100	5	2	10	3	11	6	19	0	58	3	15
1200	5	2	24	3	32	7	4	1	7	3	39
1300	4.5	3	2	4	27	8	58	1	25	4	36
1400	4	3	57	5	47	11	33	1	43	5	56
1500	3.5	5	3	7	30	15	48	2	11	7	35
1600	3	6	40	9	32	20	0	2	49	10	0
1700	2.5	9	14	13	20	30	0	3	57	13	51
1800	2.5	10	32	16	13	35	20	4	33	18	28
1900	2	16	10	25	0	50	0	6	49	24	15
2000	2	20	0	30	0	1	(hr.)	7	30	30	0
					3. RAPID FIRE.						
100	10	0	17					0	9		
200		0	30					0	10		
300		0	41					0	17		
400		0	53					0	24		
500		1	1					0	29		
600		1	10					0	33		
700		1	17					0	35		
800		1	28					0	42		

If we suppose the distance unknown, Table XII must be replaced by the following up to 800 metres.

TABLE XIII.

Time during which 100 skirmishers must fire against a line 100 metres long to put 45 per cent. of its effective *hors de combat*, the distance being unknown.

Range. M.	No. of shots per man per minute.	Skirmishers standing. Min.	Sec.	Skirmishers kneeling. Min.	Sec.	Skirmishers lying down. Min.	Sec.	Cavalry. Min.	Sec.
300	5.0	0	31	1	04	3	32	0	17
400	5.0	0	42	1	32	5	13	0	21
500	4.5	1	06	2	29	8	58	0	31
600	4.5	1	31	3	31	14	38	0	43
700	4.0	2	23	5	22	18	45	1	05
800	4.0	3	00	7	30	25	00	1	30

For distances greater than 800 metres, we take double the numbers given in Table XII.

These tables will permit the solution of problems of the following kind:

How much time and how many cartridges will be required by a company of 200 men to inflict on a battery of artillery in action at 1500 metres, a loss equal to 45 per cent. of its effective?

From Table XII, 100 skirmishers should fire for 15 minutes and ten seconds (the distance supposed unknown) in order to reach the required result. For 200 skirmishers one-half the time would evidently be required, or 7 minutes 35 seconds. The rapidity being 3.5 shots per minute, we will give to each man 27 cartridges, which will be 5400 for the company. This calculation should evidently be considered as approximate only, and to avoid any mischance one would do wisely in exercises in time of peace to increase the number of cartridges to be fired, so that if by accident the rapidity of the fire surpasses expectation, we would not be taken unawares by lack of ammunition.

We have chosen the ratio of 45 per cent. of losses because that is the per cent. which the Germans consider as antecedent to the complete disorganization of the unit which suffers it, but any other might be adopted just as well. Let us suppose for example that we desire to know the time necessary for a detachment of 100 men to inflict on an adversary a loss equal to about one-fourth of his effective (26 per cent.). Table IX shows that this per cent. is obtained when each file receives 0.30 hits. To solve the problem it is sufficient to divide by 2 the figures in Tables XII and XIII.

(*To be continued.*)

THE PROFESSIONAL STUDY OF MILITARY HISTORY.

By Colonel LONSDALE HALE (late R.E.).

(*From the Journal of the Royal United Service Institution.*)

DR. MAGUIRE brought before us, a few days ago, the Study of Military History, as a factor in the training of the nation; to-day, I bring that study again before you, but this time as a factor in the training of the soldier. The two uses of the study must be kept separate, and must not be confused with each other. To emphasize the difference between them, I have introduced into the title of this lecture the word "Professional."

But, as a military instructor, a military lecturer, I cannot but regard with dislike the title by which the subject of this lecture is generally known; for in it are two words, which, unfortunately, cause not a few officers, but many, to entertain strong prejudices against the subject itself, if not to neglect it or ignore it altogether. The first of these words is "Study," the second is "History," each, in the opinion of these officers, bad enough alone, but when in juxtaposition, forming a combination absolutely detestable. For the corps of British officers consists mainly of men who, if asked the now historic question, "Is life worth living?" would reply with a decided affirmative; but with this answer would be coupled an equally decided reservation, that a very large proportion of the life must be spent in fighting and thrashing somebody or other, this exciting occupation being, at the same time, combined with overcoming those physical obstacles, which—in the form of well-nigh impracticable snow-covered mountain passes, such as lie between India and Chitral, of Burmese and Ashantee jungles, of the waterless deserts of the Soudan, or of the fever-breeding rivers, which are the highways into the heart of Africa—Nature seems purposely to have placed in their way. To the men who regard these unpleasant places as "happy hunting-grounds," men of sinew, thews and muscle, sound in wind and limb, men whose forefathers won, and who themselves are maintaining the territory acquired, and, perhaps, winning yet more, "study" is a brain labor both irksome and exhausting; "history" is to them a bad dream, which, in sleep only, after some indigestible repast, comes back to them, recalling in nightmare fashion all the horrors of "crammers," and of the Literary Competitive for Sandhurst or the Militia. I gladly acknowledge that among these officers are a few who take pleasure in literary study also, and from time to time prove that they can use the pen as effectively as they wield the sword; but these are the exceptions.

With the feelings of the officers who form the majority, I, though a life-long literary student, have the deepest sympathy; I enter into their

feelings thoroughly, for I have accepted the teaching of a lesson taught me, years ago, by a very clever woman, the wife of a general officer well known to many of my cotemporaries. "What a pleasant thing reading is," I happened to remark to her. "Pleasant?" was the reply, "I hate it." "You hate reading?" I said, in utter amazement. "Yes," rejoined my friend; and she continued: "When I want to get hold of some fresh ideas and fresh facts by your pleasant reading, I have to put in front of me a lot of pages of paper, on which are a number of horrid black marks; and there I have to sit or stand, staring at these black marks; and when, after an hour or two of staring, and my eyes aching and tired with the work, I throw the book aside, I, perhaps, find that all I have got out of the marks is one fresh idea, and half a doubtful fact. Reading gives one a lot of trouble, and, except from a lot of reading, one gets very little out of it." And anyone who has ever tried to prepare a lecture on one single battle, save by the simple process known as "scissors and paste," will agree with my friend, that one does get very little even out of a fair amount of reading. And only the other day, a rising staff officer whom I found in this Institution, studying a campaign, looked up from his books and said to me in weary tones, "What a bore this reading is, this being able to get at the facts only by reading." This, gentlemen, is how reading, involved necessarily in the word "study," is naturally and fairly regarded by a large number of officers of that physical and mental constitution I have indicated to you.

Yet the study of military history, which involves the persistent gazing at a number of these hateful black marks on paper, seems to me to be a necessary part of the training of every officer, senior and junior, old and young; for the mental food thus absorbed strengthens the military mind, and makes any one—no matter the number of the military expeditions in which he may have taken part—a more efficient, a better soldier than he would have been without it.

To offer military history, as such, to the non-reading officers, is, however, as thankless a task as is putting before a high-spirited horse a feed of corn in a trough, at either end of which a black flag, bearing a death's head and cross-bones, flutters in the breeze. He is sure to shy at the flags and to bolt away. Yet eat the corn he ought. Cannot it be brought to his notice in some other way, one which, perhaps, so far from repelling him, may even attract him?

I will take that objectionable word "history" first. What is history of any kind? It is the recorded experiences of the past. Then as to the word "study." When we study anything, we are utilizing it; so for "study" we may fairly, if not with academic precision, substitute word "utilizing." The subject of this lecture stands now, therefore, "The utilizing by soldiers the recorded military experiences of the past." And for reasons which will be apparent as I proceed, I ask even the most diligent student of military history who may be present in this theatre, to think of this subject solely in the new form in which I have

just presented it to you, "the utilizing the recorded military experiences of the past."

And now let me recall to your minds certain features in these experiences, taken collectively. As to amount, they are innumerable; as to time, they are found in every period of the world's history; as to locality, there is hardly one of the countries, if one, into which the surface of the globe is mapped out, from which they cannot be gathered; as to subject, they include every single incident, small or great, with which a soldier, be he full private or full field-marshal, has to deal, or which he encounters in the field; as to the form of record, every conceivable shape, from the letter home to friend, wife, or mother, to the Commentaries of Cæsar. And what a strange collection of contrasts! some, as regards importance or survival in memory, as far apart as the poles. Alexander leading his hosts to India; a cavalry subaltern leading a patrol into Vendôme; the point of an advanced guard marching through a hostile village in France; Hannibal crossing the hostile Alps; an encounter of five or six squadrons at Boiscommun in 1870; Ziethen or Seidlitz hurling their vast hosts of cavalry against a foe; the punitive expedition to Benin; the hordes of Barbarians marching on to Rome; Cæsar, the mighty Cæsar, bridging the Rhine; a German company leader scrambling over the Saal by means of a skeleton framework in a "Fog of War."

And all these innumerable facts lie deposited in strict chronological sequence, in historic strata like those of geological formations; those most approaching the facts of to-day above and near at hand, those most divergent from them deep below. But, strange as it may appear, although each and every one of these recorded experiences is history, the more important facts are sometimes only those which are regarded as military history, and it is to them that this high-sounding title is appropriated. Against this I feel bound to protest; every recorded military experience is part of military history, and, therefore, military history includes all. But, I mention this confidentially at present, because one of the objects of this lecture is to put a certain amount of salt on the tails of some very wary military birds, and if I, prematurely, let out that these experiences are the same thing as military history, these same birds will spread their wings and fly off before the operation is completed, just as the horse shied off from the flags with the death's head and cross bones.

Now, gentlemen, as regards utilizing these experiences; and first, the purpose in view in utilizing them. One purpose may be the increase of a man's knowledge generally; another the mere satisfaction of a taste for historic knowledge; but one and only one, shall I put before you in this lecture, namely, the increase of personal professional efficiency, the making the soldier a better soldier, the enabling him to do better the work which lies before him in the field to-day and to-morrow. But since soldiers are of all ranks and all ages, the work before them is not the

same for all. A general in utilizing the experiences will need some of one class, a subaltern those of another class; moreover, the searchers after them differ in military knowledge; some of the experiences which to old soldiers are simple and clear, are Hebrew to the young soldier; the elder men will know how to utilize them, the younger require instruction in their use; how then according to my view, these experiences should be utilized by officers at different times in their career, will now be submitted for your consideration and criticism; for merely to tell officers to utilize the experiences, or to "study military history," as the phrase runs, is like setting up before him a sign-post with the inscription: "Follow this road; it leads anywhere, and everywhere but—nowhere."

To prepare himself for the work, which, when next the officer takes the field, he may have to carry out, must be the purpose for which he utilizes these experiences. If a long and assured peace were before him, this purpose might not stand in the forefront; but as no one can rely on such a peace, this remains the first object.

Take him, therefore, at the outset of his career as a cadet at the R. M. College. In the event of war breaking out, it is probable that all the cadets in the senior of the three terms would at once be commissioned; so that before he arrives at that term he should be well on in his preparation for the work which falls to a subaltern in the field, and even for the work which lies in a company command.

Many and various are the branches of military work in which, in and out of doors, he has to be initiated during his residence at the College, and but little time, proportional to the importance of the subject, can be found for instruction in what may be called his tactical work. All the more need, therefore, to keep steadily in view the one purpose of the preparation of this company officer in embryo, and not to allow the instruction to go prematurely into flights beyond. It is often forgotten that many cadets on joining the College have no notion of the real meaning of even such simple terms as battalion, squadron, battery, or brigade. Few but those who know cadets realize that the minds of many are, as regards military matters, like blank sheets of paper. The form the study of tactics should, and in fact does, take at the College is, first learning the theory of tactics, and then working out small problems on the ground—tactical exercises. But it is the arms in use on which all tactical operations depend; and therefore, this foundation, the nature and power of the arms in the hands of soldiers to-day, must be securely laid before proceeding to the erection of any superstructure in the form of a tactical exercise.

Do not the field-days at Aldershot, and manœuvres, show conclusively that it is the absence of realization of this power of modern firearms, by even senior officers, that is the cause of the tactical operation being, as it sometimes is, a tactical anachronism?

In teaching any subject, we may commence with the inculcation of

principles; but it is necessary that all teaching shall include illustrations of those principles; otherwise, although the principle may for a time lie on the surface of the brain, it may fade away, slip off, or not sink deep enough into it to fructify in the form of application to practice. Moreover, a principle is a bare abstraction, and the illustration is necessary to vivify the principle, and to explain its application to practical life. The illustration we use—the recorded military experiences of the past—is the instrument by which we fix securely the principle on the memory of the listener, and force it in deep enough to take root, and bring forth fruit in practical work. We have also, from time to time, to give to our pupils the mere dry facts called general statements, in which we may tell the cadet that the artillery to which his men will be exposed may be destructive at even 4000 paces. We may tell him that an open, bare, gentle slope is, if possible, to be shunned by him when leading his half company, for it will prove to be for them a deadly charnel-house; we may tell him that if artillery dare to come into action against his men at even so great a distance as 7–8000 paces, it will be due to the bad shooting of his men if the battery does not pay a terrible penalty for its daring; but we cannot prove to them by actual experiment the truth of our statements. Moreovor, a mere bald catalogue of distances is remembered for examination purposes, mainly like the arithmetic table which tells us that two pints make one quart, four quarts one gallon.

But the recorded military experiences come to our aid in lieu of experiments, and they serve like pictures in a book to bring out more clearly the meaning of the words and to excite interest in the minds of the readers. We should select for our future officer illustrations and experiences from that stratum of the mass in which the conditions and the powers of the arms employed, most closely approximate to those of the arms which will be in the hands of his men and of their foes. By diagrams drawn to scale, or by distances marked out on the ground, we may bring home to his mind the destruction at Sédan of a team of artillery horses by Kraft's shells at a range of 4000 paces; or Prussian guards, mounting in too close formations the glacis of St. Privât; or lastly, the Prussian batteries on the east of the Gravelotte ravine, and under fire at 700–800 yards distant, and losing all their officers, three quarters of their men, and more than their complement of horses.

And with this first impression, this impression we wish to convey to the cadet at an age when the mind is most receptive of impressions, nothing counter must be allowed to interfere. Experiences blurring the power of the impression must be kept for the present out of sight, or far away in the background. But eighteen months ago I happened to be present, when cadets were for the first time in their lives listening to the description of a real battle. In that battle one of the recorded military experiences used was a battery of 78 guns coming into action at 6–700

yards distance with perfect safety against infantry armed with weapons constructed at a time when even percussion locks and rifled barrels were not yet known.

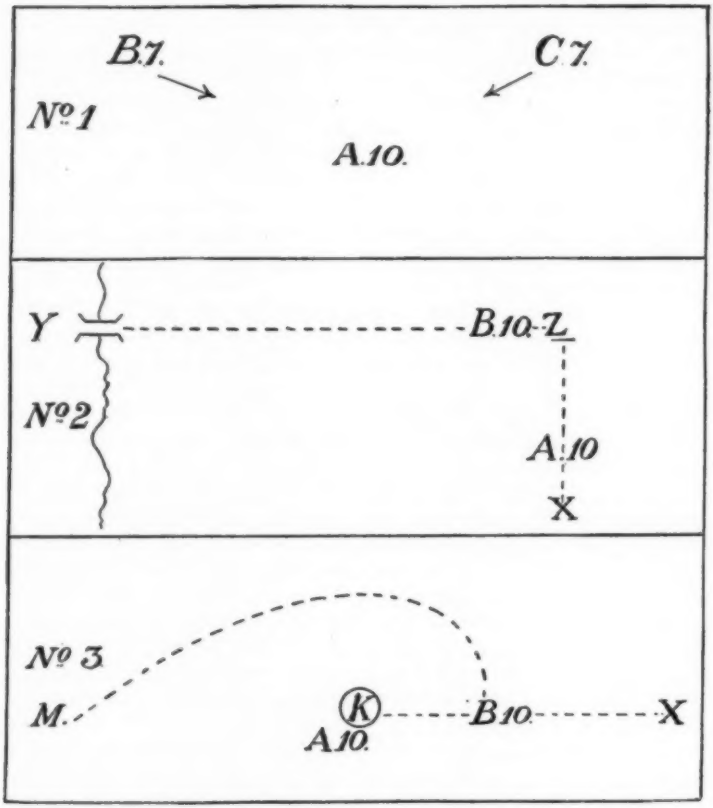
Surely, so far as preparing a cadet for company duties in the field to-day, the recorded military experiences of Cressy, Agincourt, Hastings, or perhaps Jericho, would have been as instructive; and certainly they would have been preferable, because the young mind will not confuse the experiences drawn from battles where the weapons are of different kinds altogether; whereas they may confuse those drawn from battles where the weapons used are nominally the same, and where the difference lies in the relative power of the weapons only. The experiences utilized at this stage, the introductory stage of instruction, must be only and solely those drawn from the uppermost stratum, that latest deposited. But on service, the subaltern will come across many incidents of war in which the power of the arms in use does not enter as a factor, and especially those connected with security duties and the stratagems of war, or those which show the value of high *moral*. There can be no possible objection to drawing for these on any stratum of experiences, however remote in time.

The preparation would be far from complete, were not the cadet, before he leaves the College, made acquainted with certain principles of warfare applicable to even the smallest encounter in which his half company may take part; and the teaching of these is simplicity itself, as simple as are the principles themselves. The mode of teaching them I will show by giving that of three of the principles. Those of my hearers who have been present at any of my narrative lectures on the war of 1870, or that on the "Fog of War," will remember the many square yards of paper I covered with diagrams, in order to render the subject of the lectures clear and understandable; and, therefore, I am sure they will acquit me of laziness if, on this occasion, I substitute for diagrams of that kind the blackboard and chalk. Endless paper covered with a network of spider-web lines, small red or black circles, to mark places, and stencil-plated names would have, no doubt, added dignity to the exposition of the principles to be illustrated by them; but for practical purposes the blackboard and chalk do just as well, in fact better, as they are consistent with the simplicity of the principles.

No. 1.—A is a party of 10 cadets. B and C are hostile forces each of 7 cadets, advancing in the direction shown by the arrows. A is nearer to B and also to C than these two are to each other. I remark to A, the 10 cadets, that if they await the arrival of both B and C they will be attacked by 14 cadets. I remind A that they are stronger than B or C taken singly, and I ask A how they purpose to act so as to beat the allied foes. Nearly all the young men who enter Sandhurst by the competitive examination possess a certain amount of intelligence and common sense, so I do not doubt that they would at once say that they will go for the 7 cadets A and C and thrash them, and then turn on the 7

others and repeat the process. They might, however, hesitate to give an answer at once, believing, on account of the apparently simple character of the problem, that it was one of the examination-conundrum order, and of the class of which an example may be found in: "Why does a miller wear a white hat?"

No. 2.—10 cadets A are advancing from X to Z, 10 cadets B are advancing from Y to Z by roads at right angles to each other; the road by



which B have come is the only one over the river shown on the board. The dinners are to be ready at X and Y after the fight. When B sights A, they turn to the right and face A. I now put to the 20 cadets the following question: "Which side, if beaten in the fight, has the least chance of getting its dinner?" Result of question—a general impression that "teacher" is "pulling their legs."

No. 3.—After a light breakfast, 10 cadets A go out from X to hold

the knoll K, leaving orders for lunch and dinner to be sent from X to K at 1 P. M., and 7 P. M. Meanwhile, 10 cadets B go out from M, also after breakfast, to get A off the knoll. Each cadet of this party has a full haversack of food and drink. B steals out of sight round the knoll, and, at about 12.30, when A, getting hungry is looking towards X for the men bringing the lunch, he sees B 10 cadets come between the knoll and X, and sit down and commence eating theirs. You will observe that each party now finds his opponent between themselves and their respective bases—I apologize, I mean kitchens. I think that by the time B have finished lunch and have lighted their cigarettes, the meanest intelligence among the A party, acted on by the crying demand of empty stomachs, will have been awakened to the discovery, of which of the two parties is in the least pleasant situation owing to the enemy being upon the line between themselves and their kitchens—I apologize, I mean their bases.

Three or four additional *argumenta ad homines*, and of a similar character, but with which I will not occupy your time, would be given them, and then I should tell them that although I had explained to them these principles as guides to leading companies or half companies, yet they must remember that when Frederick or Napoleon moved their armies in great campaigns, it was these same principles they tried to follow, and no others. Perhaps one of the party would be incredulous on the subject, and would tell me that his elder brother, who was cramming for the Staff College, had told him that he was learning how generals had moved their armies, and that the principles they followed were called by a very big name, the "the eternal principles of strategy," and that he was about to buy a thick quarto book in a red cover to learn what they were. My reply would be, that I was not responsible for his brother's outlay of money, judicious or injudicious, but that if the elder brother's object in buying the book was to find out what the principles of strategy are, he might spare his purse, and save much time by reading the notes of his younger brother on the little tactical exercies we have just carried out, for the principles were identical, no matter by what name called,

Initiated into the art of war in the manner I have described, the cadet leaves Sandhurst thoroughly prepared for his work as a company officer, and with the theory of war secured in his memory by the experiences recounted to him, and most applicable to the fighting of to-day; and I think that most officers commanding battalions or companies would regard such a recruit as having been very sensibly prepared for the work which he may have to carry out in the field under their orders.

I do not, however, venture to claim for him the high position of military historian and military critic, to which the cadets, the soldiers of barely one year's standing, and many of them not out of their 'teens, now justly hold. No cadet taught on the system here advocated could have obtained many marks in reply to the questions given at the R. M.

College last December in a paper headed Military History. And my reason for bringing this particular examination paper to your notice is that, in my opinion, it affords an excellent illustration of the different way in which the subject of my lecture is regarded, when it is treated as the study of military history, instead of being treated as the utilizing for practical purposes the recorded military experiences of the past.

Of the three questions, one ran as follows: "Describe, shortly, the position occupied by Wellington's army at the battle of Waterloo, pointing out its strong and weak features." (50 marks.) For fear you may have forgotten your dates, I must remind you that the date of this battle is 1815. Of couse, so far as rendering these cadets efficient subalterns in the field, and training them how to detect the weak and strong points of a position on a battle-field of 1897, a similar question on the position occupied by James' army at the battle of Sedgemoor, and so clearly and graphically described by the present Commander-in-chief in his "Life of Marlborough," would have done equally as well. But a cadet taught as advocated in this lecture would have been better able to gain marks in a question as to the strong and weak points of position where modern fire-arms are used in 1897, for he would have learned at least about one expressly chosen by a general, because it was better suited than was an alternative position for the full development of the power of the arms in use in 1870 by his troops; it was the position taken up by General Von der Tann at Coulmiers, on the 9th November, 1870. As to advanced posts, he would not possess the antiquarian knowledge of the advantages and disadvantages of a La Haye Sainte in advance of a firing line in 1815. But he would show himself at home in this matter, at all events, as it stood in 1870, fifty-five years nearer his own time—because he would have learnt not only about St. Hubert and Champenoise, but also about the little hamlet of Les Cotelles on the battle-field of Beaune la Rolande—localities all in advance of a line armed with fire-arms comparatively little dissimilar from those of to-day.

Another question given to the Sandhurst veterans ran as follows: "Q. 2. Criticise Napoleon's own movements and the disposition he made on the 17th June—the day after Ligny and Quatre Bras." (50 marks.) To this my cadet would have replied: "Being only a cadet, I find I cannot spot the mistakes made by the Aldershot generals at the field-days at Barossa and on Turf Hill, so my instructors do not ask me to criticise the operations of these officers. With regard to the general named in question 2, I should have been very happy to put down and give as my opinions those of our instructor, if he had told me what they were; but as he has not done so I cannot answer the question." May not the comment on this class of question be almost in Shakespeare's words:

"Imperious Cæsar, dead and turned to clay
Might stop a hole to keep the winds away."

Or slightly paraphasing another passage: "To what base uses may we come, Mr. Examiner Horatio. Why may not imagination trace the

convolutions of the great brain of Napoleon, till we find it stopping the bunghole in the memory of a second-term cadet at the Royal Military College?"

Do not credit me in portraying thus this branch of instruction under the Department of Military Instruction, with which I have had the good fortune to be so long connected, with any such foolish desire as to merely make fun of the instruction and to hold it up to ridicule. But, gentlemen, it is only two or three years ago that the Board of Visitors to the Royal Military College succeeded in reintroducing into that establishment a so-called study of military history, of which this examination paper is the most recent outcome; and I know that at the present moment efforts are being made, in certain influential quarters, to induce the army authorities and the Military Education Department to sanction an extension of this study on the same lines.

I have, therefore, no hesitation in saying, that, in my opinion, this method of utilizing for the youngest soldiers of our army the recorded mililary experiences of the past is out of date, and can only be regarded as obsolete, and in disaccord with that spirit of practical military teaching which is one of the most marked features of the age of military training in which we live.*

And now to the utilization of experiences by the cadets when they become officers. We may consider these officers as bifurcating into two sets: one of officers who determine to throw study to the winds until any promotion examination begins to cloud their horizon; the other of officers who, after a good long spell of rest—it may be for two or three years or more, spent in the wholesome enjoyment of young life—pick up again the dropped threads of professional study. The case of each set of officers must be considered separately; to the former, the non-reading officers, I will first offer counsel.

I do not ask you, the non-reading officers, to study military history, of which occupation you are wont to speak with supreme contempt, as fit only for bookworms and feather-bed soldiers. I wish, however, to bring to your notice the existence of a vast mass of recorded military incidents, similar to those which would happen in any war of to-day or to-morrow; and showing you how soldiers have behaved and acted in situations precisely similar to those in which you will find yourselves on service in the field. They come before you, it is true, in most objectionable shape in the form of the horrid black marks at which you so much dislike to look; but this defect can hardly be got over. But suppose for a few moments that you were voluntarily to undertake the command of a fire brigade, liable to be called out for duty at any moment. Would you not, without delay, get hold of some of the old firemen, and ask them to tell you all about putting out fires? And if no call on you

* I have been informed that my remarks on this examination paper may read as somewhat like an attack on the examiner who set it. I disclaim any such intention. The questions were of the ordinary type, and were strictly orthodox.—L. A. H.

was made for some little time, would you not as soon as possible read up the most recent reports by your predecessor on the outbreaks of fire and the mode in which they were extinguished? If you refused to avail yourself of these experience, is it not probable that at the first outbreak of fire with which you had to deal you might altogether fail to extinguish the fire, or that in extinguishing it you would sacrifice the lives of two or three firemen, where, under an experienced commander, only one need have been lost?

So, as you may at any moment have to answer to the military battle-field call, and exercise that command which you voluntarily undertook when you accepted a commission, and as you will then find yourself in a similar responsible situation, is it not reasonable that you should, in order to do your work better and not to unnecessarily sacrifice your men's lives, take the trouble to learn from the recorded experiences of older soldiers how they acted in similar difficulties? Don't let false pride or false *amour-propre* lead you to think there is anything *infra dig.* in not trusting absolutely to, and relying implicitly and solely on the aid of the contents of your own skulls, however valuable those contents may be. There was once a man who suddenly had to lead an army on a campaign; but as soon as he found out what he had to do, he did not sit down and study military history, although I lately heard one of my friends say that he did. He knew that another leader had carried out a campaign over this same tract of country not so very long before, and therefore he at once asked the military authorities of his country to send him every available record of what his predecessor had done, so that he might draw on his experiences and profit by them. That man you may not think much of, because I have told you that the faults of his application of the principles of strategy are so transparent, that even cadets at Sandhurst are considered competent to expose them; but he was a bigger man than all those 350 budding young von Moltkes put together—he was Napoleon.

I fully admit that the experiences useful to you are not in all cases easy to obtain, but many lie close at hand. I only now ask you, do you assent to the proposition that they are of value to you as practical soldiers for increasing your worth and power as practical soldiers, and for enabling you to do your duty in the field? You are, I fear, in a dilemma: for if you deny it you lay yourself open to the suspicion that the price you would charge for yourselves, skulls and contents included, per pound in the open market is somewhat exorbitant; if you assent, the reasonable corollary is that you ought to do your best to get hold of these experiences, and the final result is that the salt is firmly placed upon your tails. With it there I bid you good-bye, and ask you peacefully to slumber during the rest of this lecture, which as it is about the study of military history, neither concerns nor interests you, though it may both concern and interest some of your brother officers.

Returning to the course to be taken by the officers willing to read, the immediate purpose before them is, it must be remembered, to prepare

themselves for the work of to-day, that in which they will have to take part, the work they will have to carry out in the field. But they are also ambitious to rise in their profession, and they wish to learn more about it. A knowledge of the higher tactics and of strategy they desire to acquire. As regards the former, they will gain fresh knowledge by continuing to draw on the recorded experiences, and this they can do safely, guarded as they are by the truth already indelibly impressed on their minds that tactics depend for practical purposes on the arms in use.

As regards strategy, they, long ago, learnt what the principles of strategy are; what they want to learn is how to apply these principles to practice in the closing years of the nineteenth century. Now, any application of these principles to practice is regulated in the first instance by what may be called the military mechanical conditions existing at the time of this application. A general who is entrusted with the conduct of a campaign is given for the purpose of carrying it out an instrument known as an army, and he is told that the instrument is to be worked among certain physical surroundings known as the theatre of war; the army and the theatre of war are the military mechanical conditions. The particular way in which he will conduct the campaign depends, therefore, on the nature of the particular instrument or army he has to use, and on the physical surroundings, the theatre of war, amidst which it is to be worked. The genius of the general shows itself, not in the selecting some particular application of the principles of strategy suited merely to the relative positions of the hostile forces, but in selecting that application which is best, not only with regard to these positions, but also which is best suited to the working of his instrument amidst certain surroundings. But although the instrument and the surroundings may each bear the same name for hundreds of years, *e.g.*, the French army, the valley of the Danube; yet each varies in itself so much at different periods of history, that the mode of carrying out an operation at one time, *e.g.*, 1650 A. D., may be quite unsuitable at another time, *e.g.*, 1900 A. D. Consequently, before studying military problems of to-day involving strategy, the student must ascertain what is the particular army of to-day, the instrument in the hands of the general, and what the particular theatre of war in which the general has to work it is like. I will assume that the student selects the French army as the instrument, and the region between the Rhine and Paris as the surroundings. He proceeds to ascertain what the French army of 1897 is; and every detail of this tract of country in 1897 also. He may then select another instrument to put in the hands of a hostile general, say the German army of 1897; and having learnt all about this instrument, he may, if he chose to do so, work out the operations involved in an advance of the Germans from the Rhine on Paris. But, being perhaps somewhat doubtful of his ability to deal satisfactorily with so big a problem, and remembering that of a similar campaign in 1814 a high authority has written, "So various are the lessons conveyed by this campaign,

that the reader who has mastered it must be competent to investigate almost any problem which strategy can offer," he may, in order to get a line for the solution of the problem in 1897, draw on the recorded military experiences of the past for the example given him in 1814, by Napoleon, Blücher, and the other leaders in the campaign of that year. But he will not have examined these experiences to any extent before he will find that the instruments of 1814 differed radically from those of to-day and to-morrow in almost every respect, in composition and organization, in their wants and needs, in the mode in which those wants and needs were met; he will find that the mobility of the armies in 1897 is almost lightning speed compared with those of 1814; he will find that leaders of armies, or of portions of armies, however far apart in 1897, are in close personal communication with each other and combine their movements with perfect ease; whereas in 1814, they were hours or days apart. If he turns to the surroundings, he will find the physical features such as hill ranges or large rivers, which were obstacles to progress in 1814, tunnelled through or bridged over so as to cease to be obstacles at all; bad roads replaced by good ones, good ones increased in number, the methods of locomotion transformed. The world in 1814 seems to him so different from that of 1897, that he regards it for military operations of to-day, 1897, almost as prehistoric; and then, some one tells him of a campaign carried out not long ago in this same theatre of war, where, what I have denominated the mechanical conditions, the armies and the theatre of war, were almost identical with those of to-day. He draws forth this experience from the recently deposited stratum in which it lies. The label it bears at first checks him, for it runs "Made in Germany." He would prefer a home-made article, so he searches into the various underlying strata, but not a single home-made strategical experience subsequent to the prehistoric age can he find; so, at the risk of being thought to be deficient in patriotism and gone "German mad," he makes the best of a bad job. Needs must when the devil drives; the gentleman with the cloven hoof drives him to the Franco-German War of 1870, where he soon finds he is living among armies similar, almost identical, to those of to-day, and moving among surroundings, railways, telegraphs, roads, railway tunnels, viaducts, and chaussées, the same which meet him wherever he turns in France, in 1897. But does he find there any of the examples of strategy that he wants? I think he will find a few. Von der Tann at Coulmiers, von Werder on the Lisaine, von Goeben at St. Quentin, forced to form front to a flank under modern conditions, just as was Mack when facing Moreau under prehistoric conditions; Bazaine and Prince Frederick Charles at Vionville both forming front to a flank, as their forefathers are said to have done in old time at Jena; the advance on Le Mans from Chartres and Orleans is similar to that which the Archduke Charles opposed in the basin of the Danube; Gravelotte shows an army placing itself across its enemy's communications, as does Ulm, in 1805. The time-honored and hackneyed salient

and reëntering frontier of Moreau in 1800, is replaced by that of von Moltke in 1870.

Gentlemen, with which study ought the officer, in your opinion, to begin; that of the latest, 1870, or that of the earlier period, 1814? Remember, that he is reading and studying, not for mere personal interest, but to make himself a better soldier of to-day and to-morrow.

Let me make a personal question of the matter. No doubt the locomotive drivers of George Stephenson's day managed fairly to avoid railway smashes, and to keep tolerably good time with their trains. Gentlemen, if in six months' time, you all found yourselves in the Flying Dutchman, Scotchman, or Irishman, with Colonel Lonsdale Hale about to act as driver, what would your feelings be, and would there not be a rush for accident insurance tickets, if I, putting my head into each compartment in turn, informed its occupants that they need be under no alarm for their safety, for I had been studying railways and their working ever since we parted this evening, and, knowing the principles of their working to be "eternal," it had not seemed to me to be of much importance at which end of the recorded railway experiences of the past I began, so I had employed the six months' interval in reading all about the life and times of George Stephenson; that I had spent many hours in the South Kensington Museum, where I had first mastered the driving of a locomotive built in 1812–13—the era of Moscow and Leipsic, by-the-bye—the first which ran with smooth wheels on smooth rails, and known as "Puffing Billy": then continuing my studies strictly in chronological sequence, I had taken full notes on another locomotive there, called the "Rocket," which in a prize competition in 1829 gained the prize of £500, and ran at the express speed of twenty-nine miles an hour; but I found that both the "Rocket" and poor old "Puffing Billy" had been consigned to the bourne of mechanical fossils in 1862—two years, by-the-bye, before the appearance of the infantry breech-loader as the foundation of modern tactics for the next thirty years. I should then have to tell you that, owing to the intensity of my prehistoric studies, I had been unable to avail myself of repeated invitations of drives and talk given me by a London and North-Western driver since I had undertaken to drive this particular express; but that when I next came across him, possibly in a collision that night, I intend to learn how to drive trains under a system of signalling known, I believe, as the block system, and to examine a queer-looking arrangement on this train, and called a vacuum brake, both of which are at present Double-Dutch to me; and I am resolved to do this in spite of a warning I have had to the contrary, to shut my eyes to both of them, because report says that they have been "made in Germany."

For practical soldiers, with no assured length of time for study before they may have to utilize in the field the experiences of the past, there is only one way to study and draw on these experiences. It is the way I have applied to one campaign in one theatre of war, and which is

equally applicable to all. Read military history, read the applications of the principles of strategy, read the development of the art of war, draw on the recorded military experiences of the past—not, as children, we read our Pinnock or our Goldsmith forwards from Alfred the Great to Victoria the Greater, but backwards from Victoria the Greater to Alfred the Great. Read military history, its campaigns, its strategy, its battles, its tactics, backwards—not forwards.

But most dangerous would it be, if a student, possessing a knowledge of only the mechanical conditions of a campaign, the army and the theatre of war, accepted the examples of the leaders of the past as a guide for their own action in the future. There is yet to be sought out in any and every campaign a factor which is most influential in determining the mode in which any principle of strategy shall be applied, and even, perhaps, whether its application is practical at all. That factor is the moral, actual and relative of the instruments, the opposing forces, the condition of the personnel of each; the characteristics, special and general, of led and leaders alike. Ignore this factor, and we miss the clue to the successes of the first Napoleon, to the disasters of the Third Napoleon, to the successes of Lee and Stonewall Jackson, to the disasters of Pope and McClellan. Ignore not only this factor, but also the mechanical conditions as well, and then strategy resembles a game of chess, only in all the theatres of war being as identical as are all chessboards; here the resemblance ceases, for all the war pieces, whether kings, queens, or pawns, are of equal value, not merely in one, but in all campaigns; and those of 1897 A.D. are those of 1897 B.C. Ignore all these vital differences and distinctions; then if because we have read that in time past some great master of the art, by adopting a certain gambit speedily gave check to his adversary, we determine to play our game in the same way, it will not be due to good strategy, but to luck and good fortune only, if we find that the move sanctioned by authority does not land us in a situation where checkmate to ourselves is the immediate and dire consequence.

It is the almost total neglect of the personal conditions, and the comparatively small notice taken of the mechanical conditions, that makes me object so strongly to the use of Hamley's "Operations of War" as a book for beginners. The human element enters into it hardly at all. The references to the nature of the army, the instrument; to the surroundings, the theatre of war; and to the personal characteristics are very limited, so that the study of the campaigns becomes a mere monotonous pursuit of chessmen pieces all of the same value over chessboards; a deadly dull game of hide and seek with mere statuettes labelled Ney, Napoleon, Radetsky, Wellington, Archduke Charles amidst a labyrinth of black lines, and a classically chosen and classically arranged large collections of the horrid black marks called words. If you doubt me, read Hamley's account of the campaign of Eckmühl. To anyone, who already really knows that campaign, the account may

be interesting, intelligible, and for ought I know profitable; but for those who do not, it is but dry bread, I may almost say ships' biscuit, and, to my mind, as unnutritive and indigestible.

As regards officers quartered in India, it must be remembered that warfare in India has its own special characteristics; and the military history and the recorded military experiences of warfare in that country deal with a branch of the practice of the art of war vast in size and extending over near a century and a half of time. It would be well, therefore, for these officers to devote themselves to acquiring knowledge solely with regard to Indian warfare in the past, and not to turn to warfare outside India until they have thoroughly prepared themselves for the work before them in that province of the Empire. Work, however, backwards in time, and whilst thus working forget Waterloo; and to show my perfect impartiality, I say, forget Gravelotte also.

The main characteristic of our small irregular warfare is, that it varies not so much according to the dates of campaigns, as to the locality of each; and therefore a knowledge of how warfare has been conducted successfully in one locality, is no safe guide as to its proper conduct in another. The records are not very extensive, and an officer ordered to join a force about to carry on an operation in any of these expeditions will find plenty of time to study, during his voyage to the theatre of war, the recorded military experiences relating to wars previously carried on there, But let him here also read backwards.

The study of campaigns, to be profitable, is very laborious work, so laborious that only a few gifted soldiers—and I own I envy them—can master many of them. But there are few officers who by working hard cannot master some one campaign. And the mastery, the complete mastery, of a single campaign supplies us with a touchstone, which will enable us to form a fair estimate of the practical value of the history of any campaign furnished to us by others. Knowing what one campaign really is, we know that there are, in connection with the application of strategical principles, certain points and matters with which every military historian, knowing the subject, must deal. If we find these matters ignored, or the points missed or either treated superficially, or as of no consequence, then we may put the book on one side, and rest assured that though our would-be teacher may not be the unpleasantly-voiced quadruped in the lion's skin, he certainly is but a mere, and, perhaps, but poorly-informed narrator, attempting to impose upon us, and only masquerading in the garb and mantle of the military historian; he is no teacher for us.

Grounded thoroughly in one campaign, and thus provided with the touchstone, officers who desire to learn yet more of the higher leading of war, may draw, with profit to themselves and with increase of their own professional capacity, on any recorded military experience of the past, no matter how deep down the stratum in which it lies buried in the deposits of the past; but let him, if ever tempted to pronounce judg-

ments on the conduct of leaders, remember that whilst criticism of this kind is a very simple matter, within the reach of any charlatan, it is only when such criticism has been preceded by great personal labor in collecting facts, and by the exercise of sound judgment in sorting them out and weighing them, that the criticisms themselves are worth more than the ink with which they are written, the breath used for speaking them.

Gentlemen, I hope that I have succeeded in making tolerably clear to you the three main and cardinal principles which I advocate for the study of military history by the officers of the British army. The first is that, primarily, that study should be purely utilitarian—that is, that it should be useful to the officer in the field; the second is, that it should be suited to the rank he holds, and to the work which lies immediately before him in the field; the third is, that the study should run chronologically backwards—not forwards. These three principles I submit for consideration and criticism.

And now, in conclusion, a few words to those officers who form the body of military instructors of the army, whether professors, instructors, or D.A.A.G.'s for Instruction. Although myself retired from the Active List, I think I may, without any presumption, consider myself as still one of you; and as I am now in my thirty-sixth year of continuous work as an instructor in military art, I fear I am your *doyen*—I stand first on your list of seniority. Permit me, then, to offer you one result of that long experience.

To what extent the average British officer will study his profession, or whether he will study it at all, is, I think, determined to no small extent by how he regards us, how we regard him, and how, when for instructional purposes we come in contact with him, we put this study before him. I detest the names by which we are known—Professors, Instructors, D.A.A.G.'s for Instruction—not because they designate a branch of work looked down upon by the army at large, for that day is gone by; but the evil of it is that it make teachers one caste, taught another; and it stands in the way of *camaraderie* and of the relation between the two classes being that which ought to exist. We must endeavor to make the officer understand that the sole difference between him and us lies in the fact that, somehow or other, certain knowledge of great value to soldiers on service in the field happens to be in our possession, but not in his; and this knowledge we are ready and desirous to share with him, so that he also may profit by it and have it ready for use in the field. But we must take especial pains to put before him this knowledge in its most practical shape and aspect; and, also, so far as we can, we must suit the physic not only to the wants of the patient, but also so far as possible to suit his tastes also. We shall have to admit to him that a certain amount of reading is necessary, but do not let us alarm him even by a glance at any fairly-stocked military library we may possess. But from it let us take and offer to him the lightest

literature it contains, say, "The Badge of Courage," or some book christened with some light and not alarming title. The amount of valuable professional information and knowledge to be gathered from the lighter literature of war is great indeed. If there are in our possession a letter or two from one of our own comrades, telling us how perhaps only six weeks ago he, it may be a subaltern on picket in Burmah, had repulsed an attack on the outposts, let us give him that to read and study to his profit. It is a recorded military experience of the past, it is military history as much as is Napier, Duquet, or von der Goltz. To find books of this kind for officers who read French or German is easy enough. I name one only, von Tanera's "Recollections of a Galloper." But for officers not linguists there is a sad deficiency; and were I some ten years younger I should be tempted to initiate the supply of works to make it good. But still they exist, sometimes as translations, and among them I name as an instance the chatty, cheery letters of Kraft on infantry and artillery.

This kind of reading will act as a stimulant, as a tonic to the literary appetite of the non-reading officers, and by degrees they may be led on to higher flights; and, on the strength of having found the first morsels of horrid black marks really palatable, they will, after having dallied with the *entrées* on the table of military history determine, perhaps, to remain there for the next course, and will go in boldly for a slice of the first joint, even if it be a campaign of the past, and no matter how tough or difficult to digest it may appear to be from outside inspection. And to afford them encouragement, let us on our side endeavor to throw life into the subject; let us clothe with flesh, blood, muscles, and nerves the dry bones of strategy, so that they cease their appalling rattle; let us vivify the literary prescriptions of the drill-books with the inspiring recorded experiences of our soldier forefathers of the past. Finally, for the ideas of teachers and taught, teaching and learning, let us substitute that of brother officers giving to and receiving from each other useful practical knowledge; and in no branch of our work is this more easy than in that which I have brought before you to-day, "The Professional Study of Military History."

Lieut.-Col G. F. R. HENDERSON (York and Lancashire Regiment, Professor of Military Art and History, Staff College):—There are a few points in this interesting lecture on which I should like to make a few remarks, not so much by way of objection, as of representing the other side of the question—a side which Colonel Hale has of course considered, but has not had time to touch upon. The first of these points has reference to the study of strategy. Colonel Hale has told us that the principles of strategy are few in number, and that they can be taught by a series of familar illustrations. But he has also suggested that their application is by no means so easy. I need hardly say, in common, I am sure, with the rest of the audience, that I thoroughly agree with him. You might tell a boy that the great secret of success in cricket is to play with a straight bat; but I do not think the mere knowledge of that principle would enable him to make a hundred runs at Lord's. To compass that achievement

he must see good men play and have plenty of practice. The same with strategy. A mere acquaintance with principles is insufficient. I may presume, without affectation, that I have more experience of teaching strategy than any officer here present, except Colonel Hale himself, and the outcome of my experience is that officers may know the principles of strategy by heart, and yet when it comes to application, that is when they are asked to work out a plan of operations for the attack or defense of a certain territory, they very often fail altogether. Directly they are face to face with a concrete situation they ignore principles altogether, and put on one side every single rule that has ever been laid down on the art of war. The reason is that strategy, to my mind, is a far more difficult art to master than tactics, simple as it may appear, and it is therefore of the very greatest importance that it should be studied in the right way. It certainly is absolutely essential that students of strategy—and these include all officers who aspire to command in the field—should thoroughly comprehend the changes which have been brought about by steam and the telegraph; while the part played by physical obstacles, by roads, rivers, and bridges, can never be underrated. But at the same time, it is to be remembered that means of movement and communication are not the only factors in a strategical problem. The "eternal principles," at which Colonel Hale seems rather to scoff, have still to be applied. I may quote General Sherman who had a great deal to do with railways and telegraphs. He brought his manœuvres to a successful conclusion principally by the effective use he made of modern inventions; and yet he tells us in his Memoirs that the principles of strategy on which he acted in his march through Georgia were exactly the same as those which were applied by Hannibal. To apply these principles correctly something more is needed than the correct manipulation of the railways and the telegraph. The great aim of strategy must always be the same, *i. e.*, to concentrate the superior force, moral and physical, on the field of battle, and to do this a general must outmanœuvre, outwit, and deceive his antagonist, and thus bring his full strength against a weak and vulnerable point. I would ask the lecturer, with all due deference to his thirty-six years of instruction—years for which the British army has good reason to thank him—if he is quite certain that the campaign of 1870 is the best guide for British—not German—officers as to how this may be done. I do not wish for a moment to assert that the campaign is not exceedingly instructive; but von Moltke is not the only master of the art of war. Even his most enthusiastic admirers do not rank him as greater than Wellington, than Napoleon, or than Lee, and the art of out-manœuvring, outwitting, and deceiving the enemy is not a mere matter of mechanical means. In fact, I cannot quite see that in the campaign of 1870, from the time the concentration of the German army was effected up to the battle of Sédan, that the railways and the telegraph, improved roads and more numerous bridges, played a conspicuously important part. The railways certainly facilitated to some degree, but to some degree only, the supply of the enormous hosts which crossed the Rhine; and the telegraph appears to have reduced the risk which was considered by Napoleon, Wellington, and Lee, so great a danger of dispersion. But railways and telegraphs did not affect in any marked degree, so far as I can see, the application of strategical principles. The manœuvres before Gravelotte, for instance, of the 1st and 2d armies under Moltke himself were Napoleonic in conception, and executed in exactly the same manner, and certainly (notwithstanding the lightning mobility that Colonel Hale has re-

ferred to) with no greater rapidity than Napoleon would have executed them; and the same may be said of the manœuvres before Sédan. In fact, the French were outwitted and out-manœuvred, not because the Germans had railways and the telegraph, but because von Moltke used his cavalry as did Napoleon, because his troops could march like Napoleon's, because, like Napoleon's they subsisted to a great degree on the country; and, lastly, and this is to the point, because Moltke had learned to apply strategical principles from the campaigns of Napoleon and of Frederick. Moreover, the 1870 campaign, as a guide to the application of strategical principles, is always open to the objection that von Moltke's manœuvres, like those of the other German generals, could hardly fail to be successful against an enemy so inferior in numbers, so indifferently organized, and so deplorably commanded as the French. I will cite the example of Stonewall Jackson, who was undoubtedly one of the most brilliant of modern soldiers and strategists. He commanded in a theatre of war which possessed both railways and the telegraph, and of both these auxiliaries he made most effective use; but he always carried Napoleon's maxims in his haversack. Colonel Hale has told us, that, with the telegraph, armies that are dispersed or separated can now combine together with absolute certainty. I had yesterday put into my hands a paper showing the number of times in which, during the 1870 campaign, the telegraph had proved a most uncertain instrument of war. Even at the very beginning, on the night before the first battle, the telegraph broke down altogether. As Colonel Hale will remember, there was only a distance of sixty miles between the headquarters of the German army and the headquarters of the 1st army, yet that most important telegram took twenty-four hours to traverse those sixty miles! In my own opinion the war of 1870–71 is not the best suited for the study of the influence of railways and the telegraph. For English soldiers it seems that Moltke's campaigns, as regards their auxiliaries, are far less useful than those of the Civil War in America, or than the Egyptian campaign of 1882; and so far as regards the application of strategical principles, the campaigns of Wellington have, I think a very special value. In the American, the Egyptian, and the Peninsular campaigns the sea-power played a most important part, and a knowledge of how strategy is affected by the sea-power is likely to be of more practical benefit to English commanders than a study of railways and the telegraph. Again, if, as the lecturer says, an officer studies military history in order to prepare himself for the work of to-day or to-morrow, it may be questioned whether it would not be better, if his time is limited, to confine his attention to campaigns which have been fought on theatres of war of the same character as those on which he may have to fight himself. Military operations in South Africa, or in the outlying dependencies of our own or other people's empires, have very little in common with the campaign of 1870; but they have very much in common with the campaigns in America, or with Wellington's campaigns in Spain and Portugal. And there are yet other reasons why Wellington's campaigns have a special value. Strategy is not merely a question of out-manœuvring the enemy, especially English strategy. In the first place, English strategy has its political side, for the soldier is never independent of the government; and it has its diplomatic side, for we are often assisted by allies; and, above all, organization and administrative services have often to be improvised on the spot, with insufficient means, inexperienced officials, and auxiliary troops. Within the last twelve months four comparatively junior officers have found themselves in independent com-

mands of important expeditions, and I am perfectly certain that if either Lieut.-Colonel Plumer, or Lieut.-Colonel Alderson, or Lieut. Colonel Hamilton, or Major Arnold were asked, they would say that a knowledge of the rough-and-ready methods of the Peninsula or of America would have been far more useful to them than the most intimate acquaintance with the operations of von Moltke. I may add that I can endorse to a very great extent the lecturer's criticism on the "Operations of War," as a text-book of strategy. It was for many years the sole text-book for the Staff College entrance examination; but it was discontinued, I think, in 1894. Since then officers competing have had to rely on their knowledge and observation; and the papers set, so far as I can judge, have aimed rather at discovering the measure of their capacity for hard thinking, and of their ability to apply principles to concrete cases, than the mere strength and accuracy of their memory. This has been a move in the right direction, and the results which appear in the Staff College course have been most marked.

Lieut.-Colonel SISSON C. PRATT (*p.s.c.*, retired pay, R.A.):—I cordially endorse the views laid down by the lecturer, and the army at large should thank him for pinning us down to the utilitarian aspect of military studies. To-day, however, I merely want to refer to one point which the lecturer has raised, that is, the instruction in military history at Sandhurst. I venture to put in a plea for the Waterloo campaign. Colonel Hale has referred to the necessity of illustrating the minor operations of war, advanced posts, artillery positions, etc., by means of the most recent incidents in the 1870 and subsequent campaigns. He points out that this should be done in the course of military history; but I wish to show that these matters are already dealt with at Sandhurst. They have a most elaborate course of tactics; and I submit that all these incidents in modern warfare—and I think they should be the most modern incidents—must rightly be used as illustrations in a tactical course. They have also at Sandhurst an administrative course, in which the cadets are informed of the modern organization and supply of armies. These are points which Colonel Hale has alluded to as being of practical utility in the study of military history, and a certain amount of his arguments have been swept away by the teaching of these subjects in separate courses at the Military College. With what object was the additional study instituted? I am not prepared to discuss whether it was a good or a bad measure, but there it is; and we must look at the military history of a campaign as simply the frame-work into which the several incidents of modern warfare, illustrated in the tactical lectures may fit. It also gives the cadets an idea how a campaign as a whole is conducted. Above all in dealing with young officers or cadets, the main object should be to interest them in the profession they are going to take up. To put it in a concrete form I would make a suggestion. Colonel Hale is one of the most admirable military lecturers that we have had; and if anybody can rivet the attention of an audience he will do so. Now, I would ask him to imagine himself in this hall faced by a hundred Sandhurst cadets, while lecturing on the Waterloo campaign. I venture to say that his remarks would be followed with the most vivid attention, and that the dropping of a pin might be heard in the room. At the close of the lecture, too, the cadets would come to him asking questions, and showing their great interest in the subject. The opening of the 1870 campaign, say up to the battle of Sédan, would also rivet the attention of the students. But let us go a little further, and take Colonel Hale's favorite campaigns on the Loire or the Lisaine, or in

the north of France. I venture to say that even with a lecturer of his great ability a large portion of the audience, after ten minutes, would be in a comatose condition.* In a military college we ought to have campaigns which are attractive to young students; and I ask, Can there be one which would appeal to a cadet more than the Waterloo campaign? Are we to send young officers into the army to whom Napoleon and Wellington are mere names? Are we to send lads into the navy to whom Trafalgar and Nelson have no meaning? I think Colonel Hale is rather unfair in suggesting that young officers cannot derive benefit from the older campaigns. To my mind, the diagram of the ten cadets and the seven cadets on the blackboard is really no more interesting than the multiplication table. I think if you can show a young officer how these same principles are worked out by large armies in the field, they will be much more impressed on his mind than by drawing diagrams on the blackboard. Then, with regard to tactics, surely any good lecturer can give valuable information from the Waterloo campaign. It is not a mere question of distances. A great deal can be taught by way of contrast. Let a lecturer describe the battle of Waterloo, and then show the cadets how the battle would have been fought under modern conditions. Let him describe a modern battle, and then refer back to Waterloo, and contrast the methods of fighting. This method of contrast is very taking to young students. You will remember that with the old temperance lecturers, one of the most vivid ways of bringing the subject to the attention of an audience was to bring forward "a terrible example," and exhibit him on the platform. I agree with Colonel Hale that military instruction should as far as possible, be of the most modern type. I would not go back to the older campaigns of Napoleon, because you cannot sufficiently interest the students in them. Colonel Hale has given us an admirable and eloquent lecture; and the object of it apparently was to attack a little bantling at the Royal Military College of some eighteen months' standing. There is a big brother, within a mile, at the Staff College. Why, then, in taking the subject of military history did he not give us his ideas as to the course which has been long established at the Staff College?

Major C. B. MAYNE, R.E.:—The point of view from which I wish to speak is the cadet stage of our service, and also of a class of officer that Colonel Hale has not mentioned—the careless reading officer. On reading this lecture, I threw myself back to my academy days, where we had a very brilliant lecturer who used to carry us away with his accounts of various campaigns. He gave us the Waterloo campaign as an illustration of older ideas and tactics, but he also gave us some account of the Franco-German War. When I left the Royal Military Academy it was with rather larger views for a cadet (indeed one rather imagined one's self as capable of leading large units) until I came to Chatham, where I had the good fortune to come under Colonel Hale's instruction. He gave us the details of companies and battalions, and I at once felt that that was the instruction I really wanted at the academy. I remember Colonel Hale telling a story of an officer who went to the Zulu campaign, and who found that the system of outposts taught by text-books was very different from the system used out there. That also was the first thing that struck me in going to the

* This prediction is directly contrary to my personal experience, for I have managed to keep two large public school audiences wide awake through the whole of "Coulmiers." The battles of the second period of the Franco-German War teem with incidents of interest to young soldiers, whilst Beaune-la-Rolande is simply dramatic.—L. A. H.

Afghan campaign, where there was a totally different state of affairs from what one had learnt in regard to large European campaigns. It was afterward my fortune to be instructor in military subjects for seven years at the Royal Military College in Canada, where I was given a free hand to arrange my course. I had the cadets for three years, but for only two hours a week, during eight months in the year. The course I established for the first year was what Colonel Hale has referred to as the knowledge of the arms of the service, upon which all tactical operations depend. I wished the young fellows to start with a knowledge of the actual facts connected with the various arms of the service, as the very elements of their work. The second year I carried them on further in tactical work, in order to make them understand the rôle they would have to play in battle when serving as officers belonging to any special arm. The third term I taught them the elements of war administration, such as lines of communications, etc. I also gave four lectures on the elementary ideas of strategy, so that when the cadets read the history of a campaign they might understand it, although they might not ever have to apply the knowledge themselves. With regard to the careless reader, I think that some may misunderstand the suggestions offered by Colonel Hale for the cadets at Sandhurst. In these suggestions it seems to me from the diagrams before us that he has dealt almost entirely with the certain questions of strategy. So much depends on moral questions and the various powers and capabilities of different commanders, and even of the troops, that I think these diagrams *per se* are of little value. They assume that all the seven cadets and the ten cadets are of equal value, that the distances are equally easy to traverse, and that there is nothing intervening that would make it more difficult for one party to cross over them than another. In real war those parties represent units of a totally different value. The distances are no real guide, because there may be obstacles which may impede the movement of one party more than the other. Colonel Hale has himself told us that the cadet would leave Sandhurst "initiated into the art of war in the manner I have described. The cadet leaves Sandhurst thoroughly prepared for his work as a company officer, and with the theories of war secured in his memory." Now it seems to me that those diagrams do not give him any idea at all of his duties as a company commander leading men in the field. I am sure Colonel Hale would repudiate that construction, but still the words are there, and a careless reader might take advantage of them and quote them against him. To me the power of the various arms of the service is the principal thing for cadets to learn, and in the examples that are given them to illustrate these things they should be told that all strategy and tactics depend largely on human judgment. Even in reading books like Hamley's "Operations of War," one is apt to look upon strategy as a geometrical art. Really strategy and tactics—however simple they may appear in the pretty diagrams to be found in various books—when you come into the field they are largely matters of human judgment in certain circumstances and environments. They are not matters of geometrical relationship such as could be expressed by diagrams on paper. As to modern mechanical inventions, they do nothing more than offer facilities for action by the use that is made of them by human judgment. The difference between great leaders and bad leaders is the good or bad use of their judgment in regard to these things. Colonel Hale tells us that the study of military history should be utilitarian. But I think it should also be suited to the rank that the officer holds. The cadet on leaving Sand-

hurst should certainly know the very elements of our profession, and the complaint I would make in regard to our military educational system is the gap that exists between the Sandhurst cadet and the officer at the Staff College. The Sandhurst cadet when he becomes an officer has not any real opportunities for the further study of the various branches of his profession until he goes to the Staff College. The various D.A.A. Generals for Instruction are chiefly employed in helping officers to pass promotion exams only. This serious gap between Sandhurst and the Staff College is, to my mind, one of the evils of our system. In conclusion, I should like to take exception to the definition of the word "study" which Colonel Hale has given us, namely, "The utilizing by soldiers the recorded military experiences of the past." I should prefer to define it as, "The personal appropriation by soldiers of the recorded experience of the past, for the purpose of utilizing it in the future." The mere study of experiences is not the same as their utilization. What is wanted is the personal appropriation of those experiences in order to enable the soldier to opportunely utilize them at some future period.

T. M. MAGUIRE, M.A., LL.D., Barrister-at-law:—I certainly would not have dared to intrude myself upon the audience so soon after having occupied so long a time last week, were it not that Colonel Hale personally asked me to say a few words. I am sorry that these words will consist, in the main, of disagreement with Colonel Hale from beginning to end. But although that is so, I desire to begin by saying that I entirely appreciate, as other gentlemen do, the services of Colonel Hale; and I am willing to admit that I am, in many respects, his disciple and follower. But I object, in the first place, to the change in the title of the lecture. If Colonel Hale had asked me to come down with a prepared speech on the subject, I should have found when I came into the hall that the speech would not have suited the occasion. The title is, "The Professional Study of Military History," but it has been changed into this, "The Utilization of Military History for Immediate Tactical Purposes by Young Boys, and for Strategical Purposes by Generals"; but that is another thing altogether. I find that Colonel Hale, in the course of his lecture, confused three distinct things. What is generally known as strategy or military history? How do we distinguish strategy or military history? In colleges and books it is generally regarded as quite a distinct thing, not in its essence, but as a subject of study—quite a distinct class of study from tactics. I can quite understand that Colonel Hale might wish to alter that. He might teach that strategy and tactics are so closely connected, that we cannot tell where one ends and the other begins. He discriminates between military history and strategy or tactics. The gallant Colonel pointed that out also. We have classes for strategy and military history; we have classes for tactics taught by different people; and we have classes for administration and law, with the details and organization of armies taught by other instructors; whereas Colonel Hale wishes to mix up in one lecture the whole three—strategy, tactics, and the composition of the corps. Therefore his lecture is not one about military history as it is generally understood, but a lecture about three things that are different according to common usage. That, I think, is to some extent a flaw in the lecture, and tends to confuse people who may have intended to prepare speeches on the subject. Coming to the lecture itself, the gallant Colonel referred to the pictures on the board. I see these "in my mind's eye, Horatio," every day in my life, and on boards, too. I think the gallant Colonel means by the first

picture what Hamley would call interposing between parts of a divided front. He ridiculed the chessboard system of Hamley. I put it to the gallant Colonel if it would not be as well to take the campaign of Napoleon—one of the best campaigns in 1796; Napoleon being A, B being Colli, and C being the Austrian Beaulieu—if a statement of that would not have been just as well as the letters A, B, and C, and if it would not interest people more. Also, in the case of convergent lines, the first German army in Bohemia, in 1866, being at B, and the second German amry being at C, and Benedek being at A, would not that be just as good an illustration as the alphabetical letters of the gallant Colonel? I think I recognized in drawing No. 2 on the board my old friend "forming front and flank." Now, suppose instead of A and B we put in Lord Wellington and Marshal Marmont; would not the ordinary Sandhurst boy like it just as much? I know when I was a boy I would have liked it a great deal more. Then, taking No. 3—that is our very old friend—interposing between an enemy and his base. I think Colonel Hale will admit that it is so.

Colonel HALE:—I will not commit myself.

Dr. MAGUIRE:—Colonel Hale is a wise man, and he will probably not commit himself to anything; but I give him a chance of attacking me. This is interposing, as far as I can see, between the enemy and his base: very well-fed belligerents interposing between badly-arranged belligerents. Would it not be better to put Napoleon coming in between the Austrian General Melas at Marengo, or Napoleon coming down to the Danube in 1805? It would not take a bit longer. It would only take the same length of time as the gallant Colonel took in referring to those three things. Mine would be a living illustration, though the people were dead, and it would be an interesting illustration; whereas his is a mere chessboard or mathematical illustration of military history, if I may use the phrase. Now we come to the campaign of 1815, and the conduct of that examiner at Sandhurst who ventured to ask young English gentlemen what was going on in Belgium in a crisis for their race and name on the 17th June, 1815. Why should he not ask them that? There is not a tinker or tailor, or soldier or sailor, in Great Britain that ought not to know all about it, let alone the Sandhurst or Woolwich cadets. It is part of the heritage of the nation at large, and they are there to be educated to be proud of themselves, as well as to become tacticians, organizers and administrators. Surely Colonel Hale will admit that the examiner merely wanted to illustrate these points. Why was Blücher at Waterloo? Why was Grouchy not at Waterloo? That is the meaning of asking what occurred on the 17th of June. I will now come to Hamley. Undoubtedly with the present state of military education, and education at large among our people of all classes, Hamley's was a hard book. Why was it a hard book? Because gentlemen coming from public schools and going to Sandhurst and Woolwich had not the rudiments of modern history in their minds. Every French and German gentleman of the same class, and every Russian and United States gentleman of the same class, is familiar with the ordinary course of European history. There are little manuals published abroad and used abroad—quite convenient books—and I am sure the gallant Colonel will admit that any fair knowledge preliminary to the study of Hamley and of modern European history would enable one to follow the campaign of Eckmühl with ease. I used to refer gentlemen to certain pages of Alison. If they read certain pages of Alison and then went to Hamley, Hamley became to them at least as interesting as "The Adventures of Dr. Nikola," or

"The Sorrows of Satan." Now, the gallant Colonel says that this teaching of history from the past to the present, instead of from the present back to the past, is obsolete. He says, "Begin now and go backwards; any other plan is obsolete." Would the gallant Colonel mind telling me where it is obsolete? It is certainly not obsolete in England, because he says it is going on, and he complains of it going on. Is it obsolete in France? It is in vogue in France, and it is the method adopted in Kraft's book on strategy, 1859 and 1870; it is the method adopted by Rustow and Vial. Turning from books to schools—to his beloved German—why does not the gallant Colonel adopt his system? Colonel Hale says that he prefers the old system that Napoleon preferred; but Napoleon did not begin by studying the operations of Frederick the Great: he began by being commended heartily by his instructors for understanding the campaign of the people mentioned in Plutarch's Lives as a cadet He was a most diligent student of military history all round; and when he became an officer, he did as Colonel Lonsdale Hale says—he sent for the most recent illustration of operations, as in Italy in 1743, or by Prince Eugène before he went there in 1700, before going himself into action in 1796. What is the course in Germany as arranged for the German War Academy no longer ago than 1895? There are two classes (this, according to the Colonel, is obsolete). This is the newest recommendation of the German army with regard to to military history:

"A *thorough knowledge of history* forms an essential part of a general education, and is in many respects of the greatest use to every officer in his profession. Four hours the week will therefore be allotted in the first and second class to history lectures, and these ought to form the foundation of this subject, which will be *obligatory*. In the first class the lectures treat of the period 1500 to 1789, viz: (1) A summary of the development of Europe as far as the Reformation; (2) the history of the revival of learning and the Italian Renaissance; (3) The history of the Reformation in Germany with an outline of the constitution of the Empire and the social status of the different classes. The Reformation in England, France, Sweden, the Netherlands; (4) the Thirty Years' War, the English Revolution, a French history to about 1673, the revival of history, and literature, and philosophy; (5) the detailed history of the Great Elector, the development of Eastern Europe in connection with Prussian history as well as the change wrought in the political system of Western Europe through the *Spanish Succession* (*i. e.*, Marlborough); (6) *the time of Frederick the Great*, an occasional explanation of his wars and battles, and a continuous description of the whole intellectual bent of the 18th century, literature, philosophy, and legislation; (7) Catherine II., and the first and second partition of Poland. In Class II. history since 1789, viz.: (1) development of *England as a colonial Power*, the *American War of Independence*, the contemporary state of France, an explicit description of the French Revolution; (2) *Napoleon's career till 1812*, Alexander of Russia; (3) the material and intellectual state of Germany, especially of Prussia, the Stein-Hardenberg legislation, Schleiermacher, Fichte, Schelling, Hegel; (4) the War of Liberation, the Vienna Congress; (5) European policy, the literature of the Restoration; (6) the intellectual life of Germany in State and Church as far as 1848, the demands *of the English people for reform;* (7) the national bent of the people of Europe and the Revolution of 1848; (8) Napoleon III. and the War in the East (*i. e.*, Crimean War); (9) German history from 1864–71, constitution of the German Empire, the economical, socialistic, and communistic movements. Close consideration is

hereby to be given to Prussian history in this sense—how the Brandenburg-Prussian State has, through the genius of its princes and through the earnest work of its people, entered firmly with ever-increasing importance into the rank of great Powers. This should be clearly taught."

These few suggestions I commend to the lecturer, not because I am not thankful to Colonel Hale, but because he asked me to criticise his lecture; and these are a few criticisms to which, before sitting down, I will direct his attention.

Lieut.-Colonel J. A. FERGUSSON (*p. s. c.*, Professor of Tactics and Law, Royal Military College, Sandhurst):—Colonel Hale was a professor at the Staff College when I was a student, and I assure him that the attitude of my mind towards him is the same now as it was then, so that I desire to speak with the utmost deference to him. He has invited me to join in the discussion, and I therefore ask him to allow me to make a few criticisms on what he has said. In the first place, I join issue with him as to the value of the old campaigns, and I will read one of Napoleon's Maxims in support of my opinion. He says:—"Read and re-read the campaigns of Alexander, Hannibal, Cæsar, Gustavus, Turenne, Eugène, and Frederick; there is the only means of your becoming a great captain, and acquiring the secrets of the art of war. Your genius, enlightened by this study will make you reject the maxims opposed to those of these great men." Now I assure you we do not undervalue the Franco-German War. At Sandhurst, in every lecture throughout the whole course of tactics, we borrow our illustrations from the war of 1870-71. If we want to talk about wood-fighting, we go to Wörth and discuss the attack on the Niederwald. If we want to speak of the attack and defense of villages, we go to Noisseville and Neuilly; and so on throughout the course of tactics. We cannot, therefore, be charged with neglecting the lessons of the Franco-German War. But when the study of military history was added to our course at Sandhurst, we had to think (with the very limited time at our disposal) what were the best campaigns to select. In the old days there was a Professor of Military History, with an assistant who did nothing else but teach that subject. I am responsible for the work of the tactical branch of the Royal Military College just now, and we have to teach in one-third of the time allotted to cadets not only the whole of minor tactics, but military law and military administration, including a thorough knowledge of the soldier's accounts. The one object that we set before us is to turn out the cadet a good regimental officer; but added to this work, there is also a musketry course, in which we give both practical and theoretical musketry instruction. You see, therefore, the short time we have at our disposal for this great subject. I am not ashamed to say that yesterday I lectured on the battle of Waterloo. In our choice we selected the greatest battle of Wellington, and the greatest battle of von Moltke. During their second term the cadets have four lectures upon the campaign of Waterloo. During their last term the cadets have some lectures on the battle of Gravelotte, with an outline of the incidents leading up to it, in order to make it intelligible. Also, when time permits, they have lectures on the Crimea, but not for examination purposes. It is not my business to criticise the decision of the authorities. We do as we are told. We are told to teach military history, and we do the best we can in the time. Some of us might, perhaps, prefer to have popular lectures given on military history at the Royal Military College without an examination upon them. We have, however, no reason to complain of the want of interest taken by the cadets.

Although we do not boast the charm of the present lecturer, and have not got his rhetorical skill, still cadets do listen with the deepest interest to the lectures they hear. And it is not only to teach tactics and strategy that the little military history we teach is of value. What we aim at is to secure that the cadets should be interested in the study of military history, and should follow it up when they join the service. But I am prepared to defend the study of the campaign of Waterloo and the battle of Gravelotte. After all, we do not go much into strategy. The first example, however, which has been put on the board by our lecturer is illustrated in the campaign of Waterloo. If you put N for A, W for B, and B for C, it is pretty much what happened in that campaign. I quite agree with Dr. Maguire that it would be much more interesting to study examples from actual history than the very bald examples on the board. Surely, from the battle of Waterloo many tactical lessons may be learnt. If I had to select a battle illustrating the *desiderata* of a defensive position, I do not know that I could go to a better instance than Waterloo. There is first of all a gentle slope to the front and a clear view and field for fire; perfect communications throughout; the slope to the rear covering the cavalry and covering the reserves; the line of communication perpendicular to the front, and so on. Dozens of illustrations of tactics, I think, may be obtained from the battle of Waterloo.* But I plead for a study of Wellington's campaigns on other grounds. I think it would be a sad pity that it should go forth from here to the world that an English lad ought not to study Napier's "Peninsular War." Surely, the study of the brave deeds of our countrymen of old stimulates emulation, fires the young officer, and instills into him something of an ambition to follow the example which has been set him in bygone days.

Captain W. H. JAMES (*p. s. c.*, late R. E.):—I think that Colonel Hale's lecture has been an exceedingly valuable one; but he will forgive me for saying that I think if he had let himself go he would have made it still more valuable. I suppose that the caution which is born of the study of military operations has prevented him from giving vent to his feelings in his lecture this afternoon. I perfectly agree with him on one point, which is, that we should begin our studies rather from the later campaigns than from the earlier ones. If I am to take an individual, and show him the course which would be best to train him as a general, I should say he ought to read everything; but, unfortunately, time does not allow that; and if you seek to instruct men, whether they be cadets or whether they be officers, in the art of war, you must necessarily limit your course for the purposes of illustration. Now, there is one great reason why it is better to go to the newer campaigns rather than to the old, and that is the reason which I think Colonel Hale extremely well expressed in the phrase which he used in his lecture—"the mechanical conditions of war." The mechanical conditions of war change very much. To study the old wars for strategical purposes, and to deduce from them strategy for modern use, would, in my opinion, be extremely fallacious. It would be very easy to multiply examples. Take the campaign of 1796 in Germany; one great reason why the Archduke was successful in that was that he turned away from the front of Moreau and went against Jourdan. Moreau was himself ignorant for several days of what had occurred. It is difficult to believe that if modern

* Where could you find a better example of what a cavalry charge ought to be—sudden, swift, and timely—than that of Somerset's and Ponsonby's brigades?—J. A. F.

conditions had obtained, if the ubiquitous newspaper had been in existence, if the still more ubiquitous newspaper correspondent had been attached to either army, something would not have leaked out which would have given Moreau an inkling of what was going to occur. Again, take the campaign of Marengo. A campaign like that would be an absolute impossibility under modern conditions. Under no circumstances is it possible to conceive that Napoleon could have got together the so-called "Army of the Reserve," and that he could have led that army across the Alps and come down like an avalanche on the unprepared Austrian commander, who was in absolute ignorance of his great adversary's movements. Such action would be absolutely impossible nowadays. The news would have got round, perhaps through a circuitous route; but it would have reached Alessandria, and Melas would have known who was against him, and whence he was coming. This being the case, it is far better to go backwards. I do not in the least degree object to the study of these old campaigns; all knowledge is useful, and the study of the campaigns of Napoleon will always remain masterpieces for those to study who have the time to do so. But if the time is limited, they had better take up more modern wars; because until they understand modern methods, they are not in a position to deduce proper lessons from former campaigns. There is another reason why it is well to go to modern campaigns rather than to more ancient times, and that is, that we know so much more about them. A man whom I look upon, and who is looked upon in Germany—though I believe one or two obtuse Englishmen do not agree with me—as one of the greatest German military writers, the late Prince Hohenlohe-Ingelfingen, gives an amusing description how, when he was at the Kriegs-Akademie at Berlin, he was in the habit of criticising the movements of great generals, of saying that Napoleon was stupid in one direction and Frederick in another; but he justly remarked that that is an easy sort of criticism, and that unless you can put yourself in the actual position in which a great commander was, unless you know all the facts which determined his conduct, you had better leave the criticism alone. That is the reason why modern wars are much better studied than ancient ones. Of course, I know that if you go to the pages of the German official account, you will not find these things recorded. For example, with regard to the orders of Prince Frederick Charles before the last day of fighting round Le Mans. The first set of orders were prepared, but never issued, as in the meantime, information came in that the Xth Corps had entered the town. He had prepared for a situation of doubt, a situation of what might have been disaster. He had prepared those orders on what he knew; but information came in which totally changed his views of the situation, and fresh orders were issued. There is no record of that kind in any of the old campaigns. You do not get what the French call the *vie intime* of military life in the old records. Then contrast the campaign of 1806, as given by Sir Edward Hamley, and as given in the fuller treatises of Foucart and Lettow-Vorbeck. There you have the words of two modern first-rate military writers, putting before you the thousand and one different factors which went to determine the situation from day to day. I do not know of any ancient war with regard to which you have such information available if you wish to read about it. That, as I have said, is one great reason why, to my thinking, in military study we should begin with that about which we know most, and about which we can get the greatest information. One good example of the value of the study of military history in all its intimate

details, is the contrast between the conduct of the Prussian organizers and leaders in the war of 1866 and in the war of 1870. 1866 was the "prentice hand" of these great men, when they learned war by experience, and afterwards knew what alterations were required. They changed their views in the use of artillery, in the use of cavalry, and the way in which they formed advance guards, and so on. Again, they improved their system of supply. That was the result of what they did in 1866, and immediately after 1870 you see the same process going on. They again set to work, not resting idly on their laurels, to see what lessons were taught by the war, so as to improve and bring up the army to the highest possible pitch of perfection. We sometimes hear the foolish remark that these things are "made in Germany." Fortunately for us they are so. They are made in Germany because we have not had war brought home to us in the way that the Germans have had it brought home to them; and, for my part, I only hope that all the lessons of war will be made in Germany, or Belgium, or France, or anywhere else except in our own country. There is one thing I am fully convinced of, that is, the value of the study of European war. It is by no means sure that at the end of this century we may not be engaged in a European war; and as long as there is that possibility before us we should base the education of our soldiers on European warfare. There is another good reason why this should be done: savage warfare, say in India or in Africa, is merely European warfare with a difference. The strategy does not differ. The strategy which we should employ if we were leading an army of a million men against the French would be precisely the same as we should employ in leading 5000 men against the Zulus. We should, in either case, endeavor to annihilate the enemy's field force, and at the same time to cut off his source of supply. These are the two main points of strategy, applying equally to savage and civilized warfare. Moreover, with regard to tactics, you cannot base tactics, at any rate the manœuvring portion of it, on conduct against savages armed with inferior weapons. But if as the foundation of your tactics you have laid down, by study and consideration, those principles which are right against a civilized enemy, then *mutatis mutandis*, you can use them against inferior savages. It is for these reasons that I deprecate the statement that it does no good to English officers to study European war. If you do not base your studies on European war, you will never be able to meet the savage. Similarly, I hold that for the general study of war, while it is undoubtedly useful and desirable to study wars fought out by the great masters of the art on the various theatres of war—as Moltke did, for instance, previous to 1866, but as the Austrians did not do—however desirable it is to follow out the movements of the ancient masters, still it is essential that our teaching of the military art should be based on those conditions which prevail at the present moment; and the differences between these and those obtaining in former wars must be borne in mind if the study of the latter is to be of any utility.

Mr. H. SPENSER WILKINSON:—As an outsider I feel a certain amount of surprise at the course which the discussion has taken. Attracted by the title of Colonel Hale's paper, I came here in the hope of hearing something about the professional study of war; and I am much disappointed to find Colonel Hale, and most of the officers who follow him, discussing the study of military history, as a matter for the instruction of boys, or for officers of the army who have no time. I understand by the professional study of a subject, its study by

those who are competent to deal with, and the principal part of whose lives is devoted to the subject in question. I am perfectly startled to hear the theory put forward that the British officer has only time to become acquainted with one campaign, or perhaps one and a half. In any other profession—in the profession of the law in which I was brought up, or in the profession of medicine—it is generally expected that the competent man not only understands the practice of his own day, but has learnt the development of his science from the beginning; and I should have supposed that by the professional study of war we meant that kind of knowledge. By history, I understand the course of development; and I should have expected the professional study of military history to mean the development of the practice, and the history of the principles governing it, from the beginning of time to the present day. But I find no conception of that kind in most of what we have heard. Of course, any study is undertaken with some object. What are the objects that we have heard of? Colonel Hale puts the whole matter as though it were the way in which a young officer was going to learn how to command a company. I put it to you as professional soldiers, Will a young officer be made much better able to handle his company, because he has studied past campaigns? I think you will probably say, that all that he will gain in the management of his company from studying past campaigns is a certain amount of illustration of what may be done with a company from those not very numerous cases in which the very detailed actions of companies are recorded. How few are the past actions in which we know in full detail the precise object of the captain handling his company in battle! Colonel Hale used a phrase in the course of his lecture to the effect that tactics consisted in the application of the weapons of the epoch at which the battles take place. Where can you find a campaign fought with weapons resembling those of to-day? Colonel Hale informed his audience that the battle of Waterloo was fought in 1815, his point I suppose being that it was a long time ago. One might remind him that the Franco-German War was fought in 1870—27 years ago, and that instead of the very imperfect breech-loader with which the Germans were then armed, all armies are now armed with the magazine rifle, and in a short time the old field-gun will probably be changed for the quick-firing field-gun. I very much doubt whether you will get much more practical hints as to the management of a company, apart from the question of morale, from the war of 1870 than from the campaign of 1815. The advice of Napoleon to officers to study military history has already been quoted. He advised them to read and read again the campaigns of the great masters, beginning with Alexander the Great. Does anyone suppose that when Napoleon said that, he was giving advice to a company officer as to how to lead a patrol? I take it that he thought that military history was a study from which those who were likely to be responsible for the management of a war would learn how to conduct it, and that it was for governments and commanders that this study was necessary. When I hear it said that this is impossible, and that these campaigns are too many, it occurs to me that much more in our own time than in Napoleon's the man who is in the least degree likely to be called upon to command an army in the field, or advise a government on the conduct of a campaign, will not be a young man of twenty-five or thirty. It is very unlikely that he will be as young as Napoleon in his first campaign—the experience is that he is usually already a grey-headed gentleman; and I think that in the course of his life up to that time, if he is a professional man, he ought to have

had time to master the secrets of his profession, including military history. As to the method of study, my friend Colonel Hale has not, I think, very fairly criticised General Hamley's text-book. As I was, I believe, the first writer on military literature who criticised rather severely General Hamley's book, I may be allowed to say a word in its defense. If the book is to be taken as the last word on military history, no doubt it is not satisfactory, because you will not get from it the whole conditions in which a campaign is fought; but I take it that that was not General Hamley's object. I take it that what he wanted was to write an elementary treatise on the principles of strategy, and for that purpose he found it desirable not merely to give definitions, but to illustrate them; and if we read his book as a series of definitions with illustrations, I certainly say, in spite of all that has been said against the book in past times, that I do not think any better book of the sort exists in any language. But if you read General Hamley's book and stop there you will get a very distorted idea of the different campaigns, because his purpose is merely to illustrate from different campaigns what is meant by such expressions as "interior lines" and those things which Colonel Hale has put on the board. Although Colonel Hale condemns General Hamley, he appears to me to stand on General Hamley's ground, because when he talks about strategy he says, speaking of his favorite campaign of 1870, that the student will find there the examples of strategy that he wants. What is the strategy that Colonel Hale wants? It consists in such ideas as forming front and flank and an army placing itself across its adversary's communications; in other words, he is anxious to illustrate certain elementary definitions. I happened yesterday to be making a reference to Marmont's little book called "The Spirit of Military Institutions." In reading the preface I was much struck by what was said by Marmont, perhaps the most serious student among the brilliant marshals of Napoleon. Marmont says that the study of military history is very valuable, because it gives certain eternal principles of which the application is very difficult. Then, again, he says that one of the greatest masters in his business who ever lived was Napoleon. What does he say of Napoleon? How does he show that he was a great strategist? He does not say that he knew all about interior lines, forming front to a flank, and so on; but he says that nobody knew better where to strike his blow; *nul n'a mieux su reconnaître d'avance le point où il devait frapper.*

I think a great deal of advantage would be gained in a professional study of military history if we were much more accustomed to ask ourselves the large question on which the opening of all campaigns depends—why did the general, in the first instance, choose the particular course of action which he followed? Colonel Henderson has well reminded us that war is a political matter; that it is a quarrel between two governments, and that before you can have a war well conducted, the government must know its mind, must know what it wants from the other government, and by what process of force it can compel the other government to change its mind; and in making up its mind as to how it will apply that force, it requires strategical advice and knowledge; then you require the general to execute the plan which he has suggested, and put before his government. I am now speaking, not as a professional soldier, because I am not one, but as a student much interested in watching the progress of professional thought in the British army. I see here professional men discussing professional study, and taking it on the level of what is to be done with school-boys. I will venture on a second instance of where I think the professional study of

the British army falls short of what it should be. I am speaking, not to cadets, but to distinguished officers like yourself, sir, whom we look upon as the great leaders of our army. We have heard Colonel Hale telling us about the Franco-German War. He tells us these battles were more modern than the battles of Napoleon; and Colonel Henderson tells us how certain strategical combinations are better illustrated by it than by the battles of Napoleon. During the last three years you have had published the whole of the strategical discussions and investigations worked out by Moltke before he began his campaigns of 1866 and 1870, whereas, until a few years ago, you did not know what Moltke was driving at except by inference from the opening moves of those campaigns. You can now follow every modifications of those plans to suit the political situation existing at the time. But, although those books have been published for two or three years, I have looked in vain to this institution, and to our professors of military history, to see some comparison of those movements with similar discussions and considerations which have guided previous campaigns. I agree with our lecturer in saying that military history should be studied backwards in this sense, that no one can venture to examine or criticise the operations of a general, unless he is himself a competent man. If a man cannot himself sit down and say "In this position those are the orders I should give, those are the arrangements I should make for this division and that division," if he has not accustomed himself to work out a campaign as a series of problems which he endeavors to solve, I should say that his criticisms on the operations of a general in the field will be worthless. It is the professional man, the man whose business it is, or might be, to conduct operations, the man who will take pains to put himself in the commander's place, and then criticise—it is such a man who will throw light upon the subject. Before he can do that he must have learnt his business as a soldier by professional study. I can understand attempts made by a man who does know his own business as a soldier, and has made himself a competent general, to examine the course adopted by a number of previous generals, and, by a comparison of the experience of Frederick the Great, Moltke, and so on, to discover what are those general principles of which we hear so much, the application of which differs from time to time; and I believe that, by starting from the political situation and asking one's self what was the object which the two governments had at the beginning of the war, and how the general could endeavor to attain that object, and how he proposed to make his movements tell on the decisions of the opposing government—starting from that we may get a clue to what happened in a good many campaigns, and, by a comparison in that way of a sufficient number of campaigns, we shall see something of the development and the nature of war, and so see that war in every age is the reflection of the general state of society and civilization of the time in which it is carried on.

THE CHAIRMAN (Major-General Sir W. F. Butler, K.C.B.):—The extremely interesting paper which we have heard, and the exhaustive discussion which followed it, have left the chairman very little to say—very little, at any rate, that can be regarded as original—because the ground has been perfectly covered. I think we are all agreed with Colonel Hale—there was no difference of opinion on that point even amongst those who differed so much from him—as to the desirability and necessity of the study of military history. The difference arose in regard to the method of application of that study—whether it was to be read backwards or forwards. As a free-lance in the

study of military history, it seems to me that so much was shown on both sides that the truth probably lay somewhere between the lecturer and his critics, as is often the case in these matters of difference. The only question, it appeared to me, that was not covered either in the lecture or the discussion was that military history must be, from its very nature, an imperfect record of the truth. That is a very wide statement, but I think I can prove it. So far as the lesson conveyed by military history is concerned, its most valuable part must be a lesson of defeat, just as doctors study disease in order to arrive at health. Now, I do not think that the beacons or marks, or whatever they may be called, which are set up in military history for the guidance of students are always accurately and justly placed, and the worst of it is that the nearer we approach the time under review—the nearer it it is to us—the less likely are we to find these buoys or beacons placed upon the particular shoals and rocks which they should indicate. Few men who write history, especially military history, do it for the mere sake of abstract truth. They approach the subject from other points; they have to think of their patrons and their readers, and, more than all, they think of their own prejudices and partialities. But far be it from me to disapprove of, or throw cold water upon, the study. On the contrary, I believe that the very widest and most extensive study of military history is not only desirable, but absolutely necessary to the development of the military mind. All I contend is, that we do not possess, and I do not think any nation possesses, a really accurate, sound, truthful text-book upon any of the military events of the last forty years. The great advantages of the old books is that we may be sure they are pretty fair. When we speak of Hannibal and Cæsar, we have no prejudice in the matter. Bur it is a very different thing if you begin at the "prehistoric time of 1815," for then our prejudices were hot, and our partialities still glowing. That, I think, is the reason why it is necessary to go back to earlier examples, because we are sure that we are dealing with a fair and just estimate of the age. Take, for instance, the campaign of 1815, or the expedition in the Crimea; have we any just, true, and accurate account or explanation of all the causes underlying the disasters in these campaigns—in which as much is said, and as fairly said, on one side as on the other, like the summing-up of a judge before a jury? If we have, I certainly have not read it. I doubt if such a work exists, even in regard to the campaign to which Colonel Hale has directed so much attention; in fact, the nearer we come to our own time, the more rampant will be the prejudices, and the stronger the partialities. The great strategic principles of war, to my mind, vary only in their application—their essence remains the same; but they are not for every-day use—they must remain the study of a few minds—what can be for every-day use is that part of military history which deals with, and teaches, the tactical or intelligent application of means to ends. The use of brain in directing the effort and labor of the body, and above all that higher mental culture so difficult of definition, was undoubtedly in the mind of Charles Gordon when he wrote from Khartoum, as one of his last messages, that the study of Plutarch's Lives was of greater consequence to a young officer than all the major or minor tactics ever written. Gentlemen, I am sure that I voice your united feelings when I convey to Colonel Hale our sincere thanks and appreciation for the paper he has read to us. Colonel Hale has been identified perhaps more than anyone now living with the study of the teaching of military history. He informed me when we were coming to the hall, that it is now twenty-one years since he gave his first lecture in the

neighboring hall of this Institution. That is a long period. No critic has a bed of roses, and least of all a military critic ; and we owe all the greater thanks to Colonel Lonsdale Hale that, through storm and sunshine, he has always openly and fearlessly spoken his mind on all military questions. That is not always an easy thing to do. No matter whether we differ from him or agree with him, we must all recognize that no more ardent teacher has been among us ; and even though some of us may disagree with many points in his lecture, we owe it to him that he started the hare which has given us so much interest this evening.

Note by the LECTURER :—

The best method of studying military history has lately been a subject of keen discussion. One of the chief objects in the delivery of my lecture was to obtain the views held on this matter by officers qualified by experience and knowledge to pronounce opinions upon it. Each officer who took part in the discussion had, therefore, received from me beforehand a printed copy of the lecture. The speeches may consequently be fairly regarded not merely as replies to the lecturer, but as carefully-considered expositions of the views of the speakers on the study of military history, and as such they are of special value. Readers of the *Journal* have now before them a number of separate short essays on the matter, and will be able to form their own opinions thereon. Naturally, I hold to my own views, for "a man convinced against his will is of that opinion still." Moreover, I think that sometimes the speakers had a little misunderstood me. I desire to record my obligations to them for having taken the trouble to come and take part in the discussion.—L. A. H.

WITH THE TURKISH ARMY IN THE EPIRUS.*

By CAPTAIN C. B. NORMAN.

(*From the United Service Magazine, London.*)

THE chief interest in the recent Turko-Grecian War very naturally centred in Thessaly. It was through that province that the Greeks made their initial incursions, and it was there that the fiercest fighting was anticipated. The operations in the Epirus were practically neglected. It is true that the *Times* and *Daily News* had special correspondents with the Greek forces at Arta, but I was fortunate enough to be the only foreigner present with the Turkish army during the operations, and, thanks to the kindness of Lieutenant-General Osman Pasha, was left absolutely free and unfettered in my movements. The campaign, owing to the absence of representatives from the leading papers, was not brought prominently before the English public ; and yet, for the military student, it was not without its lessons.

The Turkish troops were operating in a country honeycombed with disaffection, the bulk of the population being alien alike in race and religion to their rulers. The Commander-in-chief, Lieutenant-General

*See map in July number, 1897.

Ahmed Hifzi Pasha, Governor of Janina, was an effete septuagenarian, who never ventured to visit the troops at the front. The regiments, with the exception of the 21st and 22d of the Nizam, were all Redif Corps, badly officered and deficient in drill, discipline and equipment. They were entirely dependent for reinforcements, munitions, and supplies on a narrow mountain road upwards of two hundred miles in length. No organized system of transport existed, and all the fighting, such as it was, took place over a rough, mountainous country, deficient in all means of communication. Roads there were none, with the exception of that which connected Monastir, the actual base, with Prevesa on the Adriatic. Had Turkey held the command of the sea, this latter seaport would have been the real base of operations, and our lines of communication would have been twenty-five instead of two hundred miles in length.

My reasons for venturing to lay before professional readers my views of the campaign in the Epirus are twofold: first, I was the only foreigner present with the Turkish army, and feel it my duty to contradict in the most emphatic way many of the misstatements which have been put forward by the Greek political authorities as to the conduct of the Turks in this province; secondly, I am the only Englishman who, having been present with the Ottoman forces during the Russo-Turkish War of 1877, and the Turko-Grecian Campaign of 1897, can compare from actual observation and experience the Turkish army of to-day with that of twenty years ago. My own personal experiences can be of little interest, and I will sink them as far as possible, dwelling mainly on the chief features of the campaign, on the organization of the Turkish army, and on its ability to take the field against a foeman more worthy of its steel than it met in the spring of this year.

I will not touch on the campaign in Thessaly, which has been most fully dealt with by abler pens than mine, but will confine myself to that waged by the army of Janina; and I will first briefly describe the theatre of war and the composition of the army with which I spent six very happy weeks. Before doing so, however, it will be necessary for me to explain as concisely as possible the military organization of Turkey, in order that I may later on clearly bring out a point which I do not think has been thoroughly grasped by the English press, or even by our military authorities—the utter ease with which Turkey crumpled up her antagonist without making use of her active army.

The keynote of the Turkish military system is universal conscription for Mohammedans, with absolute exemption for Christians on payment of a small tax amounting to about three shillings per head; this tax is paid, not by individuals, but by the Conseils Laiques of churches, so that the extreme poor escape all taxation under this head. The period of service is twenty years, and is thus divided:

1. Six years in the Nizam or active army, four with the colors, two with the Reserve.

2. Eight years in the Redif or Army of Reserve.

3. Six years in the Mustahfiz or Territorial army.

The empire is divided into six military districts, which furnish seven army corps to the Nizam or active army, their headquarters being respectively:

I.	Army	Corps,	Constantinople.	V.	Army	Corps,	Bagdad.
II.	"	"	Adrianople.	VI.	"	"	Damascus.
III.	"	"	Salonica.	VII.	"	"	Sanaa in Yemne.
IV.	"	"	Erzeroum.				

In the month of September, 1895, I was permitted by the editor of the *United Service Magazine* to give at some detail the composition of the Turkish army, so that I will now merely state that the Nizam troops in each corps comprise:

5 regiments of cavalry.
2 divisions of infantry, each division consisting of two brigades with one battalion of Chasseurs.
3 batteries horse artillery.
24 " field "
6 " mountain. "

The infantry brigade consists of two regiments, each of four battalions, so that there are thirty-four battalions in each army corps. A modification of this organization was decided on in 1895, when in consequence of the threatening state of affairs in Macedonia and in Greece, the third corps of Salonica was increased to four divisions of Nizam.

There are also four Redif divisions in each corps with a just proportion of cavalry and artillery. Thus it will be seen that the third army corps which is faced by Greece on the south, Montenegro in the northwest, Bosnia in the north, Servia and Bulgaria in the northeast, could, on mobilization, put the following troops into the field:

	Nizam.	Redif.
Cavalry	5 regiments	nil.
Artillery	33 batteries	"
Infantry	68 battalions	64 battalions.

As the Redif are only mobilized when active operations are pending, it is evident that officers and men are inferior both in drill and discipline to those of Nizam regiment. The officers of the latter are younger, and the subaltern ranks (mainly recruited from the military colleges of Haleji-Oglou for artillery, and Pancaldi for cavalry and infantry) have all gone through a severe course of military education under professors who have imbibed their knowledge in Berlin or in Paris. In the Redif, on the other hand, there are many subalterns well on the shady side of fifty, and during this campaign I met more than one captain who held the same rank in the Russo-Turkish War twenty years ago. For good, dogged fighting these men cannot be surpassed; but neither physically nor intellectually are they the equal of their comrades in the Nizam.

Dealing as I am with the operations in the Epirus, it will suffice to

say that Janina was the headquarters of a brigade of Nizam infantry, whilst Monastir, one hundred and sixty miles to the north, was the headquarters of an infantry division of Redifs. These troops were mobilized in the autumn of 1895, those from Monastir being moved down south, so that Ahmed Hifzi Pasha, the Governor of Janina, having been reinforced by a division of Redif from Anatolia in the early part of 1896, had, at the outbreak of the war, the following troops at his disposal:

Cavalry	4 squadrons.
Artillery	4 field batteries, 24 guns.
"	2 mountain batteries, 12 guns.
Infantry	Nizam, 8 battalions.
"	Redif, 32 battalions.

The cavalry were armed with a badly-shaped, badly-balanced sabre, and a Peabody-Martini carbine. They were indifferently mounted on small country-bred horses; but as in 1877 so in 1897 the cavalry that I saw were destitute of training and were only used for orderly work.

The field artillery were armed with a 7½-centimetre gun, made by Krupp on the Manteli system, throwing a 12-pound common, and a 14-pound shrapnel shell; the horses were mostly Hungarian, and the batteries were all well commanded, and smartly turned out. Little use, however, was made of this arm during the campaign.

The mountain batteries were armed with a similar gun, though, of course, shorter in length, carried by mules. This weapon was no match for the screw guns, of which the Greeks had more than one battery; and though the Turkish shell was far the heavier, yet, in point of range, the gun was so inferior, that, on the only occasion I saw the mountain batteries employed, two of our pieces were dismounted before we had got the range of the Greek battery.

The infantry carried the old Peabody-Martini rifle, which had been served out twenty years before. The weapons were in very bad condirion, and their shooting wild and defective. Each man carried sixty rounds in a pouch, and as many more as he choose in a bandolier. Some men I saw with crossed bandolier carrying one hundred rounds, others were content with twenty-five.

A glance at the map will show that the whole country of Epirus is a network of mountains, some reaching a height of upwards of 5000 feet. It is traversed by one road—that which, connecting Monastir with Prevesa, runs through Janina and Philipiadis. The frontier to be defended by Ahmed Hifzi Pasha stretched from Metzovon to the north, to the Bridge of Arta in the south, then following the northern shores of the Gulf of Arta, terminated at Prevesa in the extreme southwest.

One division held the line Metzovon to Plaka having its support at Janina, the other held the line Rapsista to Faik Pasha Redoubt in front of Arta with its main support at Philipiadis, more commonly called Luros.

Prevesa was garrisoned by two battalions of Nizam infantry, two of Redifs (both Albanians), and six hundred artillerymen. In addition to the guns of position there were two field-guns in the town which boasts a population of about four thousand souls, three-fourths of whom were Greeks.

The chief points held by the Turkish forces were:

1st Division,	Metzovon . .	2 battalions,	2 guns.
"	Palahora. . .	2 "	2 "
"	Konduraki . .	2 "	2 "
"	Suraki . .	1 battalion,	nil.
"	Plaka . . .	2 battalions,	2 guns.
"	Janina . .	7 "	18 "
2d Division,	Rapsista . . .	1 battalion.	
"	Kumujadis . .	2 battalions,	4 "
"	Faik Pasha Redoubt	4 "	12 "
"	Salahora . . .	2 "	6 obsolete weapons.
"	Old Luros . .	1 battalion,	nil.
"	Kanza . . .	2 battalions.	
"	Philipiadis (Luros)	6 "	
"	Elias Bridge .	1 battalion,	2 guns.

At both Janina and Philipiadis field hospitals and large depots of stores were established. These two places are situated on the Metzovon-Prevesa Road and are about thirty miles apart. To the east of this chaussée they are also connected by an old road once metalled but now fallen into disrepair and impracticable throughout for field-guns. This passes over a col defended by the old Genoese fort of Penti-Pegadia and through the village of Kumujadis. There was no communication between these two roads, and so far as the first division was concerned, no means of mutual support. Faik Pasha Redoubt, which was a field-work of weak profile, was armed with field-guns of 7.5 centimetres and was connected with Philipiadis by an unmetalled road, whilst on the heights opposite, the Greeks had permanent works, mounting siege guns of from ten to twenty-two centimetres in calibre. Kumujadis, Philipiadis (Luros), Elias Bridge, Kanza, and Old Luros were all connected by a metalled road, so on this point the outposts of the second division were more favorably situated than those of the first.

The frontier between Metzovon and Arta is formed by the Arta River, which runs north and south through an extremely mountainous country. In the immediate vicinity of Metzovon it is fordable; in the neighborhood of Suraku are three bridges, at Skloopa is one, at Plaka one, at Kumujadis is a ford, and there is another bridge at Arta. The Luros River runs parallel to the Arta, about ten miles to the west, and is crossed by a massive stone bridge eight miles to the north of Philipiadis, by two wooden bridges in the immediate neighborhood of that town, and by an iron bridge just below the old monastery of Elias. It is

worthy of note that neither during the Turkish retreat from nor during the Greek occupation of the Luros Valley (which lasted for ten days), was any effort made to prepare the bridges for demolition, and when the Turkish troops reoccupied Philipiadis on the 2d May, we found the four bridges over the Luros River intact.

Prevesa, a fortified seaport in the southwest corner of Turkish Albania, was defended by a few earthworks of recent construction but of no great strength, armed with two 21-centimetre guns, two 15-centimetre pieces, and others of lesser calibre. On the land side there is an old bastion trace, but the walls are in ruins and the ditch nearly filled in; on its eastern side stands an old Genoëse castle of no military value, whilst to the north is a modern battery commanding the road leading from Janina. Janina was unfortified, so that if we except Prevesa and the Faik Pasha Redoubt opposite Arta, the Turks had no works capable of holding in check even a portion of the Greek army.

Owing to the mountainous nature of the country and the absence of roads, military operations on an extended scale are impossible, and a campaign in the Epirus must always resolve itself into a series of operations waged by lightly equipped brigades accompanied only by mountain guns. For such warfare (as we have realized on the Punjab frontier), young and active commanders are as necessary as picked, well-drilled, and well-disciplined troops.

I do not propose to enter into any political question, but will content myself with the bare statement that owing to repeated incursions into Turkish territory of bands of irregular troops led by officers of the Greek army, the Sultan was compelled, much against his wish, to declare war against Greece on the 17th April. On the following morning, a Greek steamer, the *Macedonia*, endeavoring to escape from the Gulf of Arta, was fired on and sunk by the Turkish batteries at Prevesa. On the same day three vessels, supposed to be the *Spezia*, *Psara*, and *King George*, steamed up from the south and opened a heavy but ill-directed fire on the fortification of Prevesa. This cannonade was continued on the 19th and 20th, upwards of two thousand shells being thrown from the ships on those three days; little material damage was done; one gun was dismounted, but the casualties of the garrison did not exceed thirty killed and wounded. This squadron was supported by the fire of the heavy guns from the forts of Punta and Actium, as well as by that of four heavily-armed gunboats which were now shut up in the Gulf of Arta. The captain of the *Spezia* informed me, when I met him after the war, that in one day he had fired eighty-six shells from his heavy guns, and that the other vessels certainly expended an equal number. On the evening of the 20th, seeing that their fire was causing no damage, the squadron steamed away, and after that date never troubled Prevesa. It, however, bombarded and destroyed the open towns of Santa Quaranta and Pargo, towns which possessed no fortifications and no garrisons.

On the morning of the 18th the Greek forts at Arta also opened a heavy fire on the Turkish redoubt at Faik Bey. The field-guns of the Turks were soon silenced, and Major-General Mustafa Pasha, who commanded the advanced division, proceeded to withdraw his artillery from its very exposed position; the troops with Mustafa Pasha were all Albanian Redifs, their officers beneath contempt. These men, misinterpreting the movement, lost heart and commenced to fall back. Two of the battalions certainly misbehaved, and the general himself proved unworthy of his position, for on the morning of the 19th, having failed to rally the battalions of Leskovitch and Kolonia, who were composed mainly of Tsiganes, he gave orders for the general evacuation of the Luros Valley, and withdrew by the metalled road through Philipiadis towards Janina, leaving some old smooth-bore guns, which were the sole armament of an antiquated work at Salahora, in the hands of the Greeks. This movement of course enabled the Greeks to cut off all communication between Janina and Prevesa, and these communications were never reopened during the war. The Greeks followed up Mustafa Pasha, but made no attempt to press him hard or to bring him to an engagement. By the evening of the 20th they had possession of the entire Luros Valley from Kumujadis through Philipiadis to the sea, with the exception of Prevesa which, under its stout old commander, Lieutenant-Colonel Faizi Bey, held out until the armistice,

On the 21st April the Turkish right rested at Rivolistof, on the Janina Prevesa road, its left at Metzovon, the mass of the second division holding a ridge about four miles south of Janina. Naturally extreme panic reigned in that town at the sudden retreat of the Turkish army; its population consists of about twenty thousand Christians and one thousand Jews, with perhaps three or four thousand Mohammedans, who in the event of further Greek successes anticipated a pretty bad time. Ever since the Treaty of Berlin the Christian population of Janina has been in close connection with the various patriotic committees in Athens, and there is no doubt that during the war the Greek troops were never without information of Turkish movements. At this juncture, when it became known that the Turks had evacuated the Luros Valley, the most absurd rumors were current. The consuls were not the most backward in spreading "shaves," and lent themselves not a little to encourage the panic by barricading their houses and demanding large guards from the governor. On my arrival in the town I was informed that the Turkish army had been virtually annihilated, that it had lost all its guns, that three Albanian battalions had been cut to pieces, that others had disbanded themselves, that the troops were in a state of mutiny, and that the entry of the Greeks into Janina was a question of but a few hours. I was implored as I valued my life not to venture into the camp, and I was assured that on the further advance of the Greeks the Turkish troops had determined to loot and massacre the inhabitants.

In my ride from Monastir to Janina I had seen no signs of that dis-

affection which I was told existed amongst the Albanians. On the contrary, in every village at which I stopped, I met with a warm welcome, and at every stage I passed bodies of Albanian volunteers all hurrying up to be enrolled in regiments at the front, and all anxious to learn news of the war. During the three evenings that I spent on the road, I dined in village inns with Albanian volunteers; cheery, independent mountaineers they were, excellent material for irregular troops, their marching powers were wonderful; like the hill tribes on our northwestern frontier of India, they never seemed to tire, and though thoroughly disliking artillery fire they were always keen and cool under that of musketry.

Whatever disaffection there may have been when Mustafa Pasha was in command of the advanced division, it all vanished twenty-four hours after it had been rallied at Rivolisto, for then a very different stamp of man appeared on the scene in the shape of Lieutenant-General Osman Pasha, an officer of proved valor and experience. As a younster he had served some years with a Uhlan regiment in Hanover; as a major on the staff he had shown himself possessed of all the attributes of a good soldier during the siege of Batoum, and more latterly had been employed in perfecting the fortifications at the Dardanelles. Osman Pasha made but a brief stay in Janina, but at once rode out to the camp some four miles to the south of the town. There is no doubt that at this time the troops were in a desponding state, but Osman's cheery personality soon infused new life into the men. He visited each battalion in turn, reminding them of the confidence the Sultan had always reposed in his Albanian subjects, and of their duty to their sovereign and their country, and finally announced his intention of leading them against the enemy at once, as it would be an indelible stigma on the Albanian name to allow the Greeks to remain any longer on Turkish soil.

I have said that there were two roads connecting Janina with Philipiadis, the old one running parallel to the Arta River, passing through Penti-Pegadia, long since fallen into disrepair, and impracticable for guns or cavalry. The westerly one, following the course of the Luros River, well metalled, bridged, and perfectly practicable for all arms. The Greeks, who had occupied and pillaged Philipiadis on the 20th, sent forward two columns, one of which, advancing along the good road, made a reconnaissance as far as Kerasovon, and then returned. The other, which consisted of a battalion of the 10th Corfu regiment and a body of Andartes or irregular troops, moved *via* Karavan Serai to Penti-Pegadia which it occupied. It is difficult to understand the object of this movement unless the Greek commander intended to make an advance in force by the western road. Had he done so, and held in strength the "col" which dominates the valley of the Luros, he would have afforded protection to the Christian inhabitants of the Laka and Suli districts, amongst whom arms were being distributed, he would have given an impetus to the insurrectionary movement in the province of Janina, and he

would have shown himself possessed of a small amount of military energy and ability. As it was, he contented himself with marching and counter-marching in the direction of Prevesa (which he never ventured to attack), and he left his advanced battalion at Penti-Pegadia entirely unsupported and an easy prey to the Turks.

On the evening of the 22d Osman Pasha determined to retake Penti-Pegadia, and with this object he placed Redjaib Bey, his chief of the staff, in command of a small force consisting of the Evlona, Guerdje and Nazlitch, Battalions of Redif, the 4th Battalion of the 21st and the 2d Battalion of the 22d Regiment of Nizam and two mountain guns. Leaving Rivolisto at sunset Redjaib Bey arrived at the foot of the hill near Penti-Pegadia about midnight and there bivouacked his men. The hills at Penti-Pegadia are much in the shape of a horse-shoe, the concave portion facing towards Janina.

At about six A. M. on the morning of the 23d, Redjaib Bey advanced, pushing the Evlona Battalion up the left and the Guerdje Battalion up the right spur, whilst the guns and two Nizam Battalions moved forward in the centre, the Nazlitch Battalion being left to keep open communication with Osman Pasha at Rivolisto. The hills were rugged, and had the Greeks thrown up any earthworks on the heights, or endeavored in any way to strengthen the three half-ruined masonry buildings which constitute the old castle and rest house of Penti-Pegadia, they certainly ought to have held the position against Redjaib's attack. It would appear, however, that Komandouros, the colonel of the Corfu regiment, was not of the stuff of which heroes are made, and his officers were men of the same kidney. If the Greek prisoners taken on this occasion are to be trusted, their officers vanished very early in the day and a great number of men followed their example. A small handful of irregulars or Andartes occupied a knoll some five hundred yards to the right front, and about three or four hundred feet above the ruined castle. They were led by a young Englishman named Clement Harris. On the left of the position a company of the 10th Regiment also showed a good front. These two bodies held the Turks in check for some hours, but numbers told, and by 4 P. M. the Greeks were in full retreat, leaving behind them 138 dead and missing, amongst these were 22 wounded and 47 unwounded prisoners. They carried off most of their wounded with them. The Turkish loss was 52 killed and 86 wounded. Amongst the Greek dead was young Clement Harris, an English lad whose abilities had placed him in the very front rank of living composers, and whose life was full of promise. Wounded early in the day he refused to leave his post, and died setting an example of gallantry which was wasted on the men around him. Had Osman Pasha been in a position to follow up the Greeks after the capture of Penti-Pegadia there is no doubt the campaign in the Epirus would have assumed a very different complexion, but unfortunately large stores of flour and biscuit had been abandoned by Mustafa Pasha in Philipiadis, no transport trains existed, and the tem-

per and quality of the Redif Battalions were not such as to justify any hazardous measures. More than this, the Christian inhabitants of the Luros Valley and of the mountainous districts of Laka and Suli had risen in revolt and joined the Greek forces, who numbered twelve to fifteen thousand regular troops and fully ten thousand well-armed irregulars. Owing to the nature of the country, movements on any extended scale were impossible and it was known that if the irregulars were only well led, there would be great difficulty in clearing the road to Prevesa. Osman Pasha had but two battalions of Nizam troops at his disposal, for of the eight composing the Janina brigade, two were in Prevesa, two were with the division holding the Metzovon-Plaka line, and two Ahmed Hifzi Pasha retained for the defense of Janina itself. Osman Paṣha is a member of the Military Commission which permanently sits at Yildiz, and he addressed urgent representation to that body on the unsatisfactory condition of the forces in the Epirus. The Sultan responded by at once ordering up the 11th and 12th regiments of Nizam from Kirk Kilissa near Adrianople, eight battalions of Redif infantry from the Bandourma brigade in Anatolia, and a complete brigade of Redifs from Smyrna ; or thirty-two battalions in all, all armed with the Mauser rifle and admirably equipped and disciplined. Three field batteries from Monastir were also ordered to the front. As soon as Osman Pasha heard these reinforcements were on the way, and as soon as his regimental transport trains were complete, he advanced towards Luros in two columns. The 4th battalion of the 21st and the 2d battalion of the 22d regiment of Nizam with the Evlona, Guerdje, Janina, Orchrida, Nazlitch and Agiro Castro battalions of Redif, with two mountain batteries, formed the left column under his own immediate command. This moved by the Penti-Pegadia road. Eight battalions of Redif with two field-batteries under Major-General Husni Pasha advanced by the new read *via* Michaud Han and Shefik Bey Han on Philipiadis. On the 29th and 30th May the left column had slight brushes with the Greeks in the neighborhood of Rapsista, losing twenty-seven killed, and on the 2d a running fight took palce, the Greeks evacuating Karavan Serai and falling back in confusion through Kumujadis to their own frontier. Why they made no stand on this occasion is to me incomprehensible. The country was so mountainous and broken that the Turks could only advance in small groups, and owing to the precipitous ravines no mutual support was possible. The Greek staff had selected positions which they had entrenched at every coign of vantage in the course of their retreat. No stand, however, was made. The retreat became a mere *débâcle !* I passed a succession of shelter trenches and gun-pits, in not one of which had a single cartridge been burnt. The Turks lost four killed in this pursuit ; I counted eighty-nine dead bodies of the enemy on the path that I followed.

That evening (2d May) we reëntered Philipiadis, passing through Kumujadis and Strevena. All three villages had been burnt, gutted and

destroyed. It is impossible to say by whom: the Turks naturally accused the Gteeks, whilst the Greeks accused the Albanians, and the Albanians the Andartes. My opinion is, that these later were the culprits, and that the destruction was winked at by the Greek leaders, for the churches and all houses marked with a cross were spared,

On the morning of the 3d May, Osman Pasha was joined by Lieutenant-General Saad-ed-din Pasha, who had been sent on a special mission from Constantinople, but who held no clearly defined position with the army. On the same day the eight battalions under Husni Pasha marched in. I have already said that the Greeks during their stay in Philipiadis distributed several thousand stand of arms amongst the Christian inhabitants in the Luros Valley and in the villages of Laka and Suli. Osman Pasha's first care, after disposing of a sufficient force to hold in check the Greeks, was to take measures to disarm the Christian subjects of the Porte now in rebellion against their sovereign. In Hanouplou, Kumujadis, Strevena and Philipiadis we found three thousand Gras rifles, with upwards of four hundred thousand cartridges and a considerable quantity of ammunition for mountain guns. To our astonishment the two large government store-houses in Philipiadis, containing some hundreds of tons of military stores, principally flour and biscuits, were found unmolested. The doors even had never been unlocked; the town itself, however, was a pitiable wreck.

The first few days of our sojourn in Philipiadis was spent in strengthening our position on the hills running down from Kumujadis towards Arta, and also that on the Prevesa road, which was still infested by irregular bands, composed of Christian subjects of the Porte who had been armed by the Greek government and were led by Greek officers.

Our force was now disposed as follows:

Penti-Pegadia, one battalion.
Karavan Serai, two battalions.
Kumujadis, three battalions and four guns.
Philipiadis, six battalions and sixteen guns.
Elias Bridge, two battalions and four guns.

On the 7th May a small force of cavalry, on endeavoring to communicate with Prevesa, was fired on by the villagers of Kanza, losing a few men and horses. Osman at once moved out a couple of battalions against the insurgents, and a brisk little action ensued in the wooded hills to the right of the Prevesa road, the Christians of Paleohora and Flamurion supporting those in Kanza. Having repulsed the insurgents, we burnt Kanza and occupied it with two battalions; this detachment was kept constantly on the *qui vive* by repeated attacks on the part of the Christian insurgents in the Laka and Suli districts, and it became evident that vigorous steps must be taken to put an end to the insurrectionary movement, which now threatened to become very serious. A small flying column was organized under the command of Essad Pasha,

chief of the Gendarmerie, and this visited a number of villages lying between Philipiadis and the sea. Where arms were found fines were levied, where resistance was encountered villages were burnt, but where arms were voluntarily surrendered no punishment was inflicted.

Reinforcemente were now pouring into Janina, but Ahmed Hifzi Pasha, in spite of repeated and urgent demands, refused to send a man or a gun to Osman, who was consequently unable to assume the offensive. Communications with Prevesa were still interrupted, and a strong force of Greeks lay encamped on Turkish soil between Hanouplou and Arta. At this moment Ahmed Hifzi had been reinforced by eight battalions of the 6th brigade of Nizam, who, eager to join in the campaign, had covered the one hundred and fifty-six miles from Monastir in six days, bringing with them their camp equipage and three hundred rounds of spare ammunition per man—a march, I fancy, unsurpassed by any troops in the world. Eight battalions of Redif and three field batteries had also arrived at Janina. All these troops were armed with the Mauser rifle, and we at Philipiadis were indignant at this magnificent division being bottled up at Janina when it was so urgently required at the front. Rumors reached us that Saad-ed-din Pasha was to assume command of this force, and was to enter Greek territory by the bridge near Plaka, and then moving down the left bank of the river was to attack Arta on the east; whilst Osman, advancing from Hanouplou, was to coöperate by means of a frontal attack. This movement was summarily checked by the action of the Greeks themselves, who, on the afternoon of the 13th May, suddenly woke to the fact that we were strengthening our position between Grebovo and Hanouplou, and opened a heavy artillery fire on our breastworks. I had ridden into Janina on the 12th with the intention of accompanying Saad-ed-din Pasha on his expedition, which promised to be full of interest, and I was in his camp on the Janina-Metzovon road when I distinctly heard, shortly after noon on the 13th, the sound of heavy guns in the direction of Arta. On hearing from Saad-ed-din that Osman was being attacked, I at once mounted and started off for the scene of action, the distance being forty-two miles. It was past four before I got away, and I found the road much encumbered by troops and baggage animals. At nightfall I was stopped by the officer commanding at Shefik Bey Han, who refused to let me proceed further, owing to the unsettled state of the country, but at dawn he very kindly gave me an escort, and pressing on, I reached Philipiadis about 7 A. M.

As I descended the hills from the pickets at the entrance of the town, the whole scene of action lay clear before me. Far away to the south, the heavy guns from Arta and the field batteries from the plain below were playing on our troops, who covered the ridge above Hanouplou, whilst in front of these was a strong body of Greek infantry, who were keeping up a continuous rifle fire on our position. The roar of artillery on the far side of the ridge showed that the fight was heaviest there, and to that part of the field I was determined to ride, but I stayed in camp

just long enough to fill up my horse's nose-bag with barley and to see that my gendarmes did the same.

A glance at the map will show that south of the Kumujadis Pass the chain of hills which run along the right bank of the river Arta rises in lofty precipitous masses, and then, as they trend to the south, they descend gradually in a series of successive knolls to a ridge on which stands Faik Pasha's battery; they then continue in more gentle slopes to the river; from this they rise again, and on these hills stand the town and fortifications of Arta.

The position occupied by our troops, and which has been occupied by them since the early days of May, stretches from the village of Grebovo to that of Hanouplou, and though fully two thousand feet above the river, and some hundreds above Faik Pasha's redoubt, is commanded by the works in the neighborhood of Arta, in which, as I have already said, are mounted several heavy siege guns, whereas the Turks had only short mountain guns on the main ridge and light field-guns on the spur above Hanouplou. Unfortunately, too, our position on the ridge, which might have been most formidable, was only approached by a narrow mountain footpath quite impracticable for any but mountain guns. It seems incredible that during these past few months, in the course of which war has appeared inevitable, that the Turks have made no road from Philipiadis to Hanouplou, or that Ahmed Hifzi Pasha has made no effort to strengthen this very formidable position.

On leaving Osman Pasha's camp I forded the Luros stream to the east of Strevena, and striking across the plain made for the footpath leading to our position on the crest before me. As I ascended the hill I saw two Greek field batteries and some mountain guns drawn up on the Arta-Plesu road shelling our right very steadily. To these sixteen or eighteen guns we had but six field-pieces to reply, and the range, 4000 metres, was too far for any effective answer. The firing appeared hottest on the left, indeed, no serious business was going on on our right, three Redif battalions were lying down waiting the course of events' and our one field battery was fitfully responding to the Greek guns. Descending and ascending a number of ravines, I at last found myself on the summit of the range midway between the villages of Hanouplou and Grebovo. Below me, to the southeast, lay the village of Peta, from which a well-sustained fire was kept up by some long ten, twelve and fifteen centimetre guns, whilst winding along between the village and myself came a strong infantry column of, I should say, five to six thousand men with twelve mountain guns. To oppose this force we had the Redif battalion of Janina and Orchrida and two battalions of Nizam, with six mountain guns, perhaps 2500 men in all, but, alas! ours are the old-fashioned short piece, whilst those carried by the Greeks are the screw guns immortalized by Rudyard Kipling. The Greek batteries came into action at between four and five thousand metres, our maximum range is but two thousand, so the fight was very uneven, and before a quarter

of an hour had passed two of our guns were dismounted; the other four fought on until the close of the day. Under cover of the fire of their mountain guns, the Greek Evzonis deployed and advanced with considerable *élan* against our Redifs, shouting, "We, too, are Albanians, we are not the 10th Regiment from Corfu," alluding to the defeat of that corps at Penti-Pegadia on the 24th April. On coming under the fire of our infantry the Evzoni staggered and commenced to fall back, but quickly rallying they again pressed boldly forward and threatened to drive back our little force. The Redif officers did not show to much advantage, and for a few moments I thought our men, too, meant to shirk the business; however, Essad Pasha, the commander of gendarmes, himself an Albanian chief from Tirana, sprang to the front, rallying our men by his personal example, and they responding to his call once more surged forward. The Evzonis fell rapidly back, and as, broken and in disorder, they climbed the ravine opposite, the white petticoats of their dead flecked the rocks in our front as the foam of the waves on a storm-beaten shore. Having disposed of this attack, our men again withdrew to their trenches, for our total force was but seven battalions, and the Greeks must have had ten to fifteen thousand men on the ground. The hills were so broken that the four battalions on our left were practically cut off from all ready support. They were fully a mile from the battalions on the right, no road connected them, and they were face to face with a force numerically twice as strong as their own in men and immeasurably superior in guns. All this was going on in the most pitiless rain, and it was practically impossible to follow the course of the fight with any comfort or exactitude. I was wet through long before I reached Philipiadis, the blinding rain blurred my glasses, soaked my note-book and rendered my reins slippery beyond holding; my horse, too, fidgeted considerably under the fire of the heavy shells which screamed and hurtled overhead, and seemed very unhappy as whiffs of rifle shots sang merrily by. I did not care to dismount; a wet saddle leads to divers sorts of diseases and sundry kinds of death, and my chief desire on service is to keep my saddle dry.

At noon the Greeks made another determined attack on the Janina and Orchrida regiments, which was again repulsed. Our losses had been considerable; first, the supporting Pelotons had been pushed up into the firing-line, and now the reserve Pelotons were also mingled in front. We had absolutely no reserve, but our men were getting cheerier and cheerier as the day wore on, and this without any encouragement from their own worthless officers. How I longed for a handful of those smart energetic youngsters whom Zeki Pasha is turning out annually by hundreds from the military college at Pancaldi, but, alas, these are reserved for Nizam regiments, and the Redif must get on as best they may. Between four and five a third resolute attack was made, its leader, a mounted officer with four stars on his collar, falling within a hundred yards of our line. This, too, was repulsed. In the intervals of these

attacks the Turks were under a very heavy fire of infantry, varied by doses of shrapnel from the screw guns, and a well-sustained fire of common shell from the heavy pieces at Peta and Arta. Still the rain poured down unceasingly, and still the battled raged. At about five, or rather later, the sound of heavy firing to our right rear caused me to ride in that direction. I have been once caught in a flank attack on Turkish troops, and think it wise on such occasions to get first away. To my relief I descried a field battery coming into action to the southeast of Strevena, and at the same time met the head of the 11th Regiment of Nizam panting up the hill-side. Oh! welcome sight, no finer corps exists in Turkey, and the regiment stands close on 3000 men on parade. They had marched the forty-two miles from Janina in eighteen hours in a merciless downpoor of rain, and yet they came pressing into action like hounds on leash. I must confess to a feeling of intense relief. Although the Greek attack had been repulsed, we had lost very heavily in officers and men, especially the Albanian battalions of Janina and Orchrida; the former had its commanding officer and two out of its four company commanders killed. Osman Pasha at once pushed two battalions of the 11th into action, holding the other two in reserve, but with their arrival the action practically ceased, though firing continued in a desultory way until after nightfall, and I, fearing the Greeks might either make a night attack or recommence early in the morning, determined to spend the night on the hillside, where I found a hospitable shelter in the tent of some officers of the Orchrida batalion. A soldier's biscuit formed my dinner, there was no means of lighting a fire, and I think even had we possessed meat we were all too much done up to care to light one.

Despite my wet clothes I slept well enough, and at four I rose to look over the position; no Greeks were in sight nearer than the far side of the river, and riding to the front I was enabled to get a fair idea of the action, for the rain had now ceased. The ravines in our front as well as the slopes of the main hill were covered with dead and wounded, the white petticoats of the Evzonis standing out clear against the grey hillside, whilst little patches of red showed where the be-fezzed Turks lay. It is impossible to count the dead on a battle-field, especially on such a field as this. I calculate, however, that in front of the Turkish left, between 500 and 600 Greeks lay (I myself counted 476). The Turkish official loss amounted to 192 killed and 366 wounded; I think, however, this is a mild estimate. There is no doubt that for a time, especially at about 5 P. M., things were very critical, and that Osman was most anxious as to his position; had it not been for the timely arrival of the 11th Nizam, and had the Greeks been led by any one worthy of the name of a general, it would not have taken much to have pushed us once more out of the Luros Valley. We ought never to have been placed in such a predicament. For a whole week sixteen battalions of infantry and three field batteries have been lying idle in Janina. In spite of daily, nay,

almost hourly, messages, Ahmed Hifzi refused to reinforce Osman Pasha, and it was not until the Greeks had opened their attack on the afternoon of the 13th, that he was at last prevailed upon to send eight battalions.

On the same day—namely, the morning of the 14th May—a force of Greek regulars, variously estimated at between five hundred and one thousand men, with about three thousand irregulars and two small guns, landed to the northeast of Prevesa on the shores of the Gulf of Arta, between Mitika and Flamurion, and there joining hands with a body of insurgents, who had marched down from the Laka and Suli district, advanced towards the town of Prevesa. On the ridge due south of Nikopolis, Faizi Bey had thrown up some earthworks, and here all day during the 14th, whilst we were fighting at Grebovo, he was manfully holding his own against a vastly superior force of Greeks who were endeavoring to seize Prevesa. The Greeks, however, were in the open, the majority were without officers, discipline, or organization, and though superior in numbers, for Faizi Bey dared not denude Prevesa of troops, and had only two battalions engaged, the Greeks were fighting—and knew they were fighting—a losing game. In the evening they withdrew and reëmbarked, leaving their dead, wounded, some ships' signals, company flags, belonging to the first battalion Athenian Regiment, and a large number of weapons on the ground. The Turks lost about one hundred killed and wounded in this affair.

On the 16th the Greeks made one more effort, not so much to seize Prevesa as to prevent communication being opened between that town and Osman Pasha's force. Some gunboats, with officers, arms and a few regulars, steamed up the Luros River, whilst at the same time a small force was disembarked at Kastro Sykia to the west of Kanza. The officer commanding the two battalions of Turkish troops at that place, at once called up the battalions at the Elias Bridge, as well as the field-guns in position there; a brisk action ensued, the heavy guns from the Turkish works at Prevesa above the Nikopolis joining in. The Greek forces were unable to effect a junction, and, reëmbarking, steamed, the one party to the sea, the other to the Gulf of Arta. The Turks lost forty killed and wounded. The loss of the Greeks I am unable to state, but over four hundred Martini rifles and a large quantity of provisions and ammunition fell into our hands. On riding along the line of their retreat, I counted twenty-six dead bodies on the road to the Luros River; but I presume they carried away some of their dead.

On the 18th we received information that an armistice had been declared, and I at once made up my mind to ride into Prevesa. Essad Pasha kindly gave me a couple of gendarmes, and I reached our consulate that evening, having been saluted with a few shots from the Christian villagers of Flamurion as I rode under the hill below their village. I found the garrison of Prevesa full of fight and athirst for news. They had received no post since the day prior to the declaration of war. Pro-

visions were plentiful but they had run out of tobacco. I had taken in my saddle-bag and those of my gendarmes, three kilogrammes, which I asked to distribute amongst the wounded. I found the hospital, a large, airy building built of stone, and of two floors, situated in charming olive groves to the east of the town; the four upper wards only were occupied, the lower were fitted with beds all ready in case of need. The wards were airy and well-ventilated, the men well looked after in comfortable iron cots with straw palliasses, clean linen, and clean bandages. There were plenty of antiseptics in the store-room, and the only thing wanted was tobacco, which I distributed amongst the men. The total number of wounded in the hospital was fifty-four; of sick, twenty-seven. The wounded were all gun-shot wounds with the exception of two who were suffering from very dangerous wounds from fragments of shells. Including the fight on the 14th, I was told the entire losses during the siege were but thirty-five killed and ninety-three wounded. The inhabitants had suffered but little, only two having been wounded; the price of bread had risen, but there were ample supplies of flour to have lasted another month, and there were thousands of sheep feeding daily on the grassy slopes to the north of the town. So far as Prevesa was concerned its defense reflects the greatest credit on Faizi Bey; that it should have been cut off from all communication with Janina, reflects equal discredit on the military authorities at the latter place.

With the conclusion of the armistice all the active operations ceased; the Porte, however, determined to prepare for any eventuality, and reinforcements of men, war material, and provisions, were steadily sent to the front. By the commencement of June, sixty-four battalions of infantry, half of them armed with the Mauser rifle, twelve field and eight mountain batteries, were massed between Metzovon and Prevesa; two complete divisions of infantry (thirty-two battalions in all), armed with the Mauser, accompanied by six field and eight mountain batteries, with complete transport trains, being ready to cross the frontier should hostilities again break out.

I will now endeavor to draw a comparison between the Turkish army of 1897 and that which I accompanied in 1877. I had heard in Constantinople that since the accession of the present Sulton the Ottoman army had been destroyed. This was the deliberate opinion of many who were in a position to have formed a sounder judgment, but who, alas, seemed determined to imagine all things evil of the Turk. A high English official informed me that both at Zeitoun in 1895, and in the campaign against the Druses in 1896, the Turkish troops, officers and men, refused to advance under fire, and it was prophesied in more than one quarter that before the brave Greek, the hero who was setting such a noble example to Europe, the Turks stood no chance. In September, 1895, I wrote in these columns:—

"Financially Turkey is not prepared for war, and she has no intention of provoking a conflict; but should the integrity of the empire be

threatened, or the Sultan's authority put on one side, she could even yet give a very good account of any probable assailant."

It is a pleasure to me to recall those words. The late war was a complete walk over for the Turks, and the victory was due to the painstaking reforms which have been carried out in the Turkish army by the High Military Commission which, under the presidency of the Sultan, sits permanently at Yildiz Kiosk.

The radical faults in the Turkish army during the Russian War were the absence of a staff and the ignorance and incapacity of officers. Mukhtar Pasha possessed no staff, there was not an officer in his army capable of making a reconnaissance, few who could read a map, and such maps as there were, were obtained from Vienna. No field telegraph was used, outposts were unknown; divisional, brigade, and regimental commanders were ignorant of the art of handling their troops; no attempts were made to enforce cleanliness in encampments. Field hospitals were practically non-existent, amputations were forbidden without reference to Constantinople. The field treasure chest was empty, and commissariat arrangements were conspicuous by their absence. In fact, the campaign in Anatolia in 1877 was won by Mukhtar Pasha, and the private soldiers of his army, aided by three brave brigadiers, Capidan Mehmet, Ibrahim and Chefket Pashas, with that stout old Hungarian Kohlman (Faizi Pasha).

How changed was everything in 1897! The divisional commanders, Osman and Ibraham Pashas, were men of education, well versed in the theory and practice of war. The staff officers were as smart and efficient as those to be met with in any army. The two chief divisional staff officers, Majors Essad and Saleh Bey, had served for years in the German army, and were soldiers every inch of them from fez to spur. All staff and regimental field officers were served out with a most accurate map of the country on a scale of $\frac{1}{50000}$ which had been executed by the permanent staff of the Janina Brigade, under the immediate supervision of Major Redjaib Bey. The divisional commanders had in addition a large well-contoured map on the scale of $\frac{1}{10000}$, a map the superior of which I have never seen. A field telegraph accompanied the troops, and though it was cut on several occasions by the Christian insurgents, the telegraph department worked well and expeditiously. Outpost duties were thoroughly understood by the Nizam troops, and the indefatigable Saleh Bey used to have the Redif battalion out every day to give them practical instruction in this most important work. As regards drill, the Nizam and Redif battalions of the 2d Army Corps worked well and quietly; those of the 3d Corps were, as I have said before, wretchedly drilled and equipped; the fault of this I attribute mainly to Ahmed Hifzi Pasha, who was not energetic enough to see that his subordinates performed their duties. The eight battalions, comprising the 6th Infantry brigade of Nizam under Bekir Pasha, were admirably handled, and the Redif battalions of the Bandourman and

Smyrna brigade were but little inferior. The encampments of these brigades were models of neatness and cleanliness; watering-places were marked out for men and horses, latrines were properly constructed and daily filled in. Field hospitals were established at the headquarters of each division; there was one at Prevesa, three at Philipiadis, one at Plaka and five at Janina capable of accommodating an aggregate of two thousand patients; fortunately no strain was thrown on the medical men. As regards amputations, the responsibility for these rested on the senior surgeons of hospitals. Amongst the Albanian soldiery a considerable opposition existed on this head, but the Ottomans from Anatolia did much as they were ordered. There was a well-filled treasure-chest at Janina, and Osman Pasha was always able to pay not merely the villagers whose beasts were requisitioned for transport purposes, but also for the sheep and goats purchased for the use of his troops. The men too were not without money, and though the Albanians had a habit of annexing property, the men of the 2d Army Corps were as scrupulous as our native soldiery in paying for all they needed. Subsequently to the advance from Janina, at the end of May, the army was well provided with transport trains, each battalion being provided with two hundred ponies or mules, and depots were established at Strevena and Philipiadis, at Kerasovon and Karavan Serai, and also at Janina. Our supplies, therefore, were not confined to one road.

Since my return to England I have seen that Mr. Ralli, the Prime Minister of Greece, has laid before Lord Salisbury and the foreign ministers of the other great Powers, a formidable list of charges against the Turkish troops in Thessaly and the Epirus. I saw Mr. Ralli in Athens about the middle of July, when I also had the honor of being received by the Crown Prince in his camp at Santa Marina, and I know first that many of Mr. Ralli's accusations against the Turks in Thessaly are directly impugned by the Duke of Sparta, and also that Mr. Walter B. Harris has published two letters in the *Times* of the 14th July and 2d August, controverting the statements as regards the Epirus, which I too am prepared to refute. Mr. Ralli showed me a list of villages in which he informed me that churches had been destroyed by the Turks; this list was supplied to him by Mr. Lappas, the Greek Dragoman of the French Consulate at Janina. This gentleman never left Janina; neither he nor any one of the foreign consuls visited any one of these villages, and they accepted without hesitation all the stories brought to them by villagers, who were notoriously engaged in manufacturing atrocities. I too was furnished with this list, and I visited eighteen of these villages; in not one of them was the church destroyed, and in only three were the lamps smashed and the pictures (idolatrous in the eyes of the Turks) torn from their frames.

I was informed by the same authority on whom Mr. Ralli relies, that the Greek priests of Verlam, Sklibani, and Pesta, had reported to the Greek Metropolitan of Janina that they had been called on by Redjaib

Bey to bury the Greek dead after the affair of Penti-Pegadia, and that they had refused to do so as all the bodies had been mutilated in the most shameful manner, and further, that they had recognized the body of Mr. Clement Harris amongst the number. I called on the Metropolitan, who denied that any such report had been made to him, and he offered to call these three priests into Janina in order that they might confirm before me that denial. I thought it best, however, to visit these places myself, and in company with Mr. Walter Harris and Mr. Arthur Hill (Lloyd's agent at Athens) I rode out to these villages, and we interviewed the priests in their own churches. Mr. Hill, a first-rate Greek scholar, acting as interpreter, no Turkish official being present, all three priests denied in the most positive manner that any such mutilations had taken place; they averred that all the dead had died from gunshot wounds, save one officer, who had been stabbed and beheaded by an Albanian soldier. All the stories concocted about the death of Mr. Clement Harris fell to the ground when submitted to the actual test of examination, the priests and villagers disclaiming all knowledge even of his presence with the troops; and his own brother has written to the *Times* stating that, after careful personal inquiry on the spot, he is satisfied that the unfortunate lad was killed in action at Penti-Pegadia. So far from the Greek prisoners having been badly treated, I saw every man who fell into the hands of the Turks during the campaign. I visited the wounded prisoners in the hospital of Janina in company with the British consular agent at that town, himself the son of a Greek mother and the husband of a Greek wife. I visited the unwounded at Leskovitch with my Maltese dragoman, a man who spoke Greek perfectly. Both wounded and unwounded declared they had been better fed and better treated since they had fallen into the hands of the Turks than when with the Greek army. I do not think Mr. Ralli would care for me to reproduce the strictures these men passed on their government or on the bravery and capacity of their officers. The stories of women chained to carts and made to act as beasts of burden are equally false. It is true the Christian women were called out to lead mules and ponies requisitioned in their villages; their husbands had fled when the Greeks retired from Penti-Pegadia or else had joined the insurgents. At first these women were naturally frightened at being compelled to go so far from their home, and they crowded round the foreign consulates at Janina to complain. But when they found that they were regularly paid 1*s.* 6*d.* a day for their animals, all complaints ceased, and on my return from the front at every stage between Janina and Monastir, I saw these ladies sitting with the soldiers, who helped them load and unload their animals; all seemed to be on terms of greater friendship than perhaps the Christian husbands would have approved. The stories of mutilation of the dead (with the one exception of that of Captain Salomo at Penti-Pegadia) I could not substantiate. I saw eighty-nine dead after the affair at Kanza, and when I rode into Prevesa I saw seven or eight lying on the path be-

tween Flamurion and the Gulf of Arta; none of these were mutilated. Osman Pasha was a martinet; he would have no Albanian irregulars in his camp, and when Ahmed Hifzi sent him a body of three hundred horsemen he ordered them back to Janina at once. He gave the strictest orders (in compliance with instructions from Constantinople), that all pillaging and acts of violence were to be punished promptly and severely, and I am convinced that had any such acts been brought to Osman Pasha's notice he would have shot the offender. The men knew this too, and possibly this kept them in hand. I will give two more instances to show the unreliability of Mr. Ralli's statements. He complained to the Powers officially and through the press that Edhem Pasha had repeatedly violated the armistice in Thessaly, by moving forward his outposts beyond the agreed-upon line, and he adduced one specific instance, namely, that the Turks had attacked and destroyed the town of Kalabaka. H. R. H. the Duke of Sparta assured me that these complaints did not emanate from him. On the contrary he had written to Mr. Ralli stating that the Turks had never violated the armistice, that they had never crossed over the line of demarkation, that Kalabaka was many miles on the Turkish side of that line, so that Edhem Pasha was perfectly justified in occupying that village, and that when he did occupy it, there was no fighting, nor was the village destroyed. As Commander-in-chief of the Greek forces I presume the Duke of Sparta has a closer knowledge of these affairs than has Mr. Ralli, and if that statesman's other assertions are on a par with those he has made regarding the conduct of the Turks in the Epirus and in Thessaly, he certainly leans upon very unreliable informants.

As a counter-attack I would ask Mr. Ralli if he can deny the arming of the Christian subjects of the Porte in the Epirus, thus directly inviting reprisals; the pillaging by Greek officers of Fuad Bey's konak at Philipiadis; the destruction of mosques at Larissa, Velestino, Domokos, Trikhala, or the ploughing up since the Greek occupation of Thessaly of the Mohammedan graveyards in that province; the cruelties perpetrated on the mufti of Volo, and the pillaging of the flocks belonging to the Mohammedan inhabitants of Larissa immediately prior to the war. Knowing the nature of the Albanian soldiery, the Greeks, by such acts, encouraged atrocities, and it was only the firm hand of Edhem and Osman Pasha that prevented these taking place.

I will now conclude with a few statements which will perhaps interest my professional readers. I have said that the troops operating in the Epirus were dependent for reinforcements, munitions, and supplies on a narrow mountain road, two hundred miles in length, running from Monastir to Prevesa, and passing through Janina and Philipiadis (Luros). Monastir is connected with Constantinople by a single line of railway which passes by Dediagatch and Salonika; and Salonika is connected with the military centres of Mitrovitsa, Pristina, and Uskub also by a single line. It is evident, then, that without an able, energetic commandant

at Monastir the labor of forwarding supplies and reinforcements to the front would have proved an almost insurmountable task. Fortunately the governor of Monastir was a stout old soldier, who recognized no difficulties, and who infused his own energy into his subordinates. In my humble opinion the officer to whom the chief credit of this campaign is due is Lieutenant-General Abdul Kerim Pasha Vali of Monastir.

In the month of February he mobilized and sent down to Janina sixteen battalions of Redif. He purchased 1500 horses and 400 carts, which he also forwarded to headquarters as the nucleus of a transport train, and built and fitted up ten wagons for the conveyance of sick and wounded. Then as matters grew more critical he established transport depots at seven of the chief halting places between Monastir and Janina; at each of these a company of infantry to act as escort and a divisional transport train of 100 bullock wagons and 500 ponies were quartered under the command of a specially selected major. Between the 1st March and the 1st June Abdul Kerim Pasha had supervised the despatch to the front of 56 battalions of infantry, 8,000,000 rounds of small-arms ammunition, 3000 Snider and 20,000 Mauser rifles, three field and two batteries of mountain guns, 2000 mule loads of shrapnel for field and mountain artillery, 2000 tons of flour, 1500 tons of biscuits, and a complete suit of new clothing for each man of the twenty-four battalions belonging to the 3d Army Corps. In addition to this he advanced 20,000 Turkish pounds in gold from the funds of his province for the military treasure chest, and he organized a subscription in the Vilayet for the purchase of clothing and necessaries for the sick and wounded of the Monastir division, 3000 Turkish pounds being thus collected. The above figures show the nature of the task Abdul Kerim faced and overcame.

It may interest some to know the labor that devolved upon the railway authorities between Constantinople and Monastir during the course of the war. Between the 25th February and 15th June they transported 5814 wagons of provisions, 201 of ammunition, 27,462 horses, and 133,523 men.

One word more and I have done. It has never been sufficiently realized in this country that the campaign was won by the Redif troops of the Turkish empire. With the exception of the 11th and 12th Regiments of Nizam sent to Janina, and the 14th and 15th sent to Domokos (both from the 2d Army Corps), the Porte did not move a single battalion of the active army from its ordinary garrison town. The 1st and 2d Army Corps and three divisions of the 3d Corps still held the capital or still faced the frontiers of Roumelia, Bulgaria, Servia, and Bosnia. Not a Nizam soldier was withdrawn from the 4th or 5th Corps in Anatolia or in Silia. Had Servia or Bulgaria thought of throwing in their lot with Greece (and those nations are much more likely to make common cause with Turkey against Greece so long as that country maintains its pretension to Macedonia), Turkey still had 123 battalions of Nizam troops, all armed with the Mauser rifle, echeloned along the frontier. Although

the Porte was assured of the neutrality of the Balkan State, there was no need to make use of the Nizam troops when fighting against such an antagonist as Greece. Just before I started for the front, Zeki Pasha, the Grand Master of Artillery and a member of the Cabinet, said to me: "I look on this campaign as a mobilization of our Redif battalions. We unfortunately never have army manœuvres, and this will show us the weak points in our reserve system and enable us to remedy them."

That there are weak points is well known to the Minister of War and to Zeki Pasha. Many will be patent to every reader of this article. Chief amongst them are the age and incapacity of the officers of Redif battalions; the inefficiency of the cavalry; lack of long range mountain guns and range-finders; absence of any system of visual signalling, thus necessitating the employment of orderlies or staff officers to convey messages; neglect to provide for the treatment of wounded in action—no surgeon litters or field bearers accompanied the troops when moving forward to engage the enemy; paucity of engineers, and the neglect of officers of this arm to keep roads and bridges under repair. In spite of these and other faults, one fact remains incapable of disproof, namely, that the Turkish soldier has not deteriorated one whit since the days of Plevna, that the officers are far better educated than they were, and that the Turkish army is a factor which must be taken seriously into consideration by those reformers who talk so glibly of bringing pressure to bear on the Sultan.

For myself I shall ever recall with pleasure and gratitude the innumerable acts of kindness shown me by all ranks, from general officers to privates in the Army of the Epirus.

Military Notes.

CERTAIN REGULATIONS OF QUEEN ANNE'S REIGN.

THE following is a copy of certain army regulations issued during the reign of Queen Anne. They were recently discovered in the Record Office of the British Museum in the course of a search for certain articles of war. Long search was made for the articles of 1712 and 1715, with the result that these articles, dated May 1st, 1711, were found. No trace of those of 1715 could be obtained, the librarian stating that they were probably burned in the fire of 1834. G. N. L.

ANNE R.

WHEREAS many Irregularitys and abuses have been introduced into our Armys to the great prejudice of our Service and discouragment of Such as are employ'd therein, For remedy thereof and preventing as much as Possible the like for the future and for the keeping better order and discipline amongst our forces We have taken the Same into our Royall consideration, and have thought fit hereby to establish and declare the following Rules and orders w^{ch} we do require to be from hence forwards Strictly and punctually observ'd vizt.

1st Our Royall will and Pleasure is, That no Lieu^{t} General, Major General, Brigadier, nor any other Officer of our Army, who has sold and is no longer in our Service Shall in any Instance act as a Generall or other Officer, or rise in the Course

2^{d} That for the Present we will make no Promotion of Brigadiers, and for that reason the eldest Colle^{s} are to act as Brigadiers whereever such officers are wanting untill our further pleasure

3^{d} That for the future the Court of General Officers Shall consist of Lieu^{t} Gen^{lls} and Major Gen^{ls} only, exclusive of Brigadiers, and that the judge advocate Gen^{ll} of our Forces do Sumon Such of the General officers only to meet, who are to Sit for redressing abuses relating to the Army, and in Matters of a more then ordinary nature our said judge judge advocate Gen^{ll} shall make a report to us as usual but in Matters of lesser moment the Gen^{ll} Officers may referr to Courts Martial as they Shall See proper

4th As it has been observ'd that Brevetts have been obtain'd since our order to the Contrary dated the 12th of July, 1708, w^{ch} creates great inconveniences and tends very much to the prejudice of our Service, To restore therefore that order and method w^{ch} has been lost in the promotion of Officers in our Army, It is our express will and pleasure that no more brevetts be granted for the future on any pretence whatsoever

5th It is our will and Pleasure also that no Comission in our Armys

be sold but by our approbation under our Royall Sign Manual, That no officer have leave to Sell his Comission who has not serv'd Twenty Years or been disabled in the Service unless upon some extraordinary occasion where we shall think fitt for the good of our Service to allow thereof, and that in cases where we Shall consent to the disposal of any Comission twelve pence in the Pound be payd both by the buyer and seller, which it is our Intention should be apply'd to encrease the fund for our Royall Hospitall at Chelsea

6th And whereas the Admitting great Numbers of children to have Comissions in our Armys has been found to be very prejudiciall to our Service Our pleasure is that no Person shall have a Comission who is under the Age of Sixteen unless in some extraordinary Cases as we shall think fitt, pursuant where unto no Coll. is for the future to apply for a Comission for any person without certifying under his hand that Such person is of the age of Sixteen, And our Pleasure is that such Minors as are now in Comission be oblig'd at the Age of Sixteen to serve or be Cashierd unless they shall have particular leave from us under our Sign Manual to be absent

7th As to the Cloathing of our Armys We do think fitt that for the future not above fourteen months offreckonings be allow'd for a first Years cloathing, and that ten months offreckonings be reserv'd for the cloathing of the Second Year notwithstanding any former Regulation to the Contrary hereof

8th It is our will and Pleasure that for the future no person be taken into any of our Troops of Horse Guards, Granadier Guards, or Regiments of Horse and Dragoons in Great Brittain but Such as are our natural borne Subjects, and that all the private Gentlemen who now are or shall be entertain'd in our Troops of Horse and Granadier Guards do take the oaths and Test requir'd by Law

Lastly it is our will and pleasure that these Regulations do in all respects comence and take place from this day, whereof our Captain Genll and other our General & Comanders in Chief of our Forces and all our officers & others whom it doth or may Concern are to take Notice and govern themselves accordingly: Given at Our Court at St James's this first day of May 1711. in the tenth Year of our Reign

By Her Matys Comand
G. GRANVILLE.

HIGHER FLIGHTS IN FIELD TRAINING.

An infantry battalion has lately completed a field training at Kilworth Camp, Cork, which contained some novel and advanced features, when compared with the usual hackneyed and monotonous exercises. The whole battalion trained together, the first few days being devoted to elementary and grounding work, as laid down in "Infantry Drill," but with special attention to all details of attack and defense by companies, fire discipline, and control of fire. The training ground was

very suitable for practical work, consisting as it did of a heather-clad range of hills some miles in extent and broad in proportion. Its principal features were steep hill-sides scored by deep ravines, with streams running through them, thick woods here and there, occasional plateaux of grass fields surrounded by stone walls or banks, a few ruined farm buildings, cottages dotted about, and infrequent country roads intersecting it, the whole making up a country which gave ample opportunities for tactical lessons. Over this ground companies first and then half battalions were exercised against each other, fresh schemes being drawn up daily by both battalion and company commanders, every one of the latter having opportunities of commanding a half battalion in practical working schemes. This stage finished the battalion went on to its annual course of musketry, the ranges being adjacent, and completed the individual and some of the field practices. Owing to their previous practical course in the field, the young soldiers of the battalion recognized the value of good shooting, and a general improvement in this respect was the result.

The battalion then returned to field training, and as in the interim a company of Royal Engineers had arrived at Kilworth for the same purpose, the two commanding officers joined forces as far as practicable, and nearly the whole of the field engineering portion of the infantry training was done in conjunction with the Royal Engineers, with mutual benefit; for bridging, revetting, entrenching, redoubt building, gabion making, etc., was accomplished on a far more extended scale than could have been attempted otherwise by either; and this gave most of the officers of both branches a new experience and interest in what is sometimes apt to become a merely mechanical part of the annual training. Tracing and digging shelter trenches by night on a selected position were to have been carried out also, but this part of the programme had to be abridged owing to the stormy weather. Over the bridges and works thus built battles were fought, both by day and by night, and the utility of their work was thus shown to the rank and file, whilst affording a thorough test of the completeness of the lessons the men had learnt during the course of outpost duty. The remaining field practices were combined with the latter part of this training, and one day was devoted to the brigade drill firing of the two battalions quartered at Kilworth. A thorough inspection in every part of the work by the general officer commanding concluded what must have been to both officers and men an instructive and interesting series of practical field exercises. Major-General Fryer, who is all for practical training, at the conclusion of his inspection, said that the battalion had gone through "the highest and most advanced form at present" of field training, and that remark contains the crux of the whole matter.

As a rule infantry field trainings, however much they may teach the younger rank and file, are to the older soldiers, the non-commissioned officers, and more especially the officers, a mere brushing up of general

knowledge and small details previously acquired—a resuscitation of "dry bones," in fact. The higher ranks have no chance whatever of increasing their knowledge and experience; in short, field training is too often looked upon as a necessary tuition for the lower ranks only. Where both, however, can benefit equally, general good must result, and the efficiency of a battalion as a fighting unit correspondingly increase. It may therefore very fairly now be asked whether the time has not come for a generally "higher and more advanced" form of field training for the home army, such as Major-General Fryer advocates. That for infantry is carried out by brigades at Aldershot; but elsewhere in the United Kingdom little has been hitherto attempted to combine the trainings of different arms in such a manner as to practice that mutual reliance and support so necessary on service, and in this respect correct their weak points in peace time. For instance, in section 221, "Infantry Drill":—"Action against cavalry and artillery, and as escort to guns or convoy," is laid down as a subject to be practiced, and is probably conscientiously carried out by the average company commander, with but little instructive value either to himself or his men, any opposing body of cavalry or artillery being usually entirely imaginary, no opposing brain power intervening to thwart his highly successful attack.

His outposts, too, are rarely attacked except by his brother company commanders, and his reconnoitring patrols have to discover an enemy conspicuous by his absence. Such proceedings are void of interest to all taking part in them. If, on the other hand, this and similar work could be done by small parties of the three arms, by "troops, batteries, and companies," in accordance with the schemes laid down by their commanders, mistakes and foolish tactical impossibilities would soon diminish in the higher form of training, the field manœuvres of large bodies. After the necessary preliminary shelter-trench instruction of an infantry battalion has been completed, the coöperation of the Royal Engineers in the more extensive forms of field engineering must be most valuable both to the infantry and to themselves. Working alone, a company of Royal Engineers, although able to afford a large amount of skilled superintendence, cannot, with its small available strength, supply the necessary amount of labor for building extended field-works. The engineer officer thus losses an opportunity of handling large working parties, a duty which would be peculiarly his on service. In the same way an infantry company has plenty of labor available, though but little skilled superintendence to give, other than that of its officers, who are thereby precluded from building or revetting anything larger than a company shelter trench or gun epaulment, although a practical knowledge of more advanced field engineering might be most useful to them at any time during one of our "small wars." With combined forces, on the other hand, tactical positions may be properly provided with suitable earthworks for artillery and infantry, useful bridges built over real rivers, shelter trenches dug by night, and all such works attacked and defended

by mixed forces of the three arms. Similar examples could be adduced from most of the subjects laid down to be annually practiced, showing the need of combined action to produce a greater reality in the work itself, and to increase the knowledge and usefulness of all ranks.

Looked at also from a point of view rather higher, perhaps, than that of its good effects on company officers and their commands, this description of training would be most beneficial to junior field officers who have not yet passed their examinations for command, and who cannot under the present system obtain sufficient field training. Practice in commanding a small mixed force and planning minor operations, with all the working out of tactical schemes, writing of orders, etc., which it entails, must be a valuable additional experience to any officer previous to his attending a course of instruction at one of the big camps. Such, lightly sketched in outline, are some of the benefits arising from a higher form of field training. If the principle were once adopted it would, doubtless, develop gradually in a direction equally useful to the commissioned as to the other ranks of the army. Its universal adoption would, perhaps, be impossible all at once, owing to the difficulty of obtaining suitable ground everywhere; but these obstacles could be as certainly overcome as have been those of holding field manœuvres in the various districts, and without the same initial expense to the public, for ground having been already obtained for the latter purpose, and for rifle ranges could be utilized equally well for the training of small mixed forces previous to its being required for manœuvres. No doubt, the first experiment having proved successful, something further in this direction will be attempted next year, but in the meantime it is well to remember General Skobeloff's famous axiom is as true now in the great game of war as it was in the days not long past, when he applied it with such success in driving the fierce Tartar hordes out of the earthworks at Geok Tepé. "Mutual action is the secret of success in war." There is far too little mutual action in the training of British troops. The reason is not far to seek, but the fact is nevertheless to be regretted, and the mistake is one which ought to be remedied.—*Army and Navy Gazette.*

CAVALRY TACTICS.

An anonymous cavalry officer has just published a small volume upon *Cavalry Tactics* (Edward Stanford), which we can heartily commend to our readers. It possesses an especially breezy and inspiring character, for the author has no patience with the man who delights in mere parades. There is a tendency, perhaps, to go too far in his denunciation of mere smartness, for smartness is, after all, an indication of discipline. Nevertheless, we go wholly with this writer in his censure of the officer who lives wholly for parade movements, sword exercise, advance in review order, and the mere necessity of passing muster at inspections. He devotes a good deal of attention to marches, night work, advance and rear guards, pursuits and reconnaissance. Particularly good

is the chapter upon pursuits, in which the author rightly contends that no time should be allowed a beaten foe to reorganize his rear guard. Every attempt on his part to reform must be rendered futile, until disorganization sets in, and then the more disorganized he becomes the more should the cavalry be launched at him until he is thrown into disorderly flight. Pursuits must be of the most thorough character. In short, so long as any formed body of the enemy exists, it is the duty of the pursuer to shatter it, and the care of prisoners and impedimenta is a secondary consideration. All this is very excellent, but it is, as the author says, like the mere tuning of instruments before the concerted action of the whole orchestra begins. From this he proceeds to deal with cavalry *vs.* cavalry, and the gist of his argument is that the action must always be offensive, never passive, with the force moving at the highest speed compatible with good order and cohesion. Further, it must retain its formation to the very end, and should never attack without a support, because victory rests with the side which has the last formed body at its disposal. In dealing with this matter the author has something interesting to say about squadron intervals, and the recent tendency to reduce them. It is much better, he says, to instruct the men so that it becomes second nature to close in on their flanks or centre than to teach them that any opening out at all is permissible. He is fully convinced that cavalry has its field of action not less against unshaken infantry than in other cases, and he illustrates this action at length. "Above all it must not be forgotten that a determined, well-led, and well-ridden charge against infantry in whatever formation the attacking force may be, the instant the opportunity offers, is more likely to be successful than any attack in formation which takes time to assume." The author deals further with divisional cavalry, horse artillery, machine guns, escorts, ambuscades, surprises, and other matters. We have not lately read so well-considered an argument concerning the employment of cavalry, and we heartily commend the little book to every cavalry officer. It has as its motto the excellent saying of De Brack, "if the English cavalry understood war on the day of battle it would be the most terrible in Europe."—*Army and Navy Gazette.*

THE BICYCLE AND WAR.

So much has been written about the Græco-Turkish War that it would almost seem that nothing new could be added. The special interest of Mr. Wilfred Pollock's *War and a Wheel* (Chatto and Windus) is the description of how he managed to use a bicycle throughout the campaign. It enabled him to dispatch to the *Morning Post* his account of the panic-stricken flight toward Larissa in advance of his colleagues, and, at other times in the course of the campaign, seems to have served him equally well. There are no doubt countries where to bicycle is utterly impossible, but Mr. Pollock's experience led him to conclude that in many cases it is superior even to a good horse, and good horses

were scarce in the Græco-Turkish War. In regard to the general character of the campaign Mr. Pollock agrees with others that it was the most absurd of modern times. Except for General Smolenski's stand at Velestino it was merely a discreditable retreat from one good position to another, and even the Evzones, who have been credited with soldierlike character, wasted their ammunition in the most preposterous fashion, and often in direct disobedience to orders. It is not at all unlikely that correspondents on wheels will often be seen in future operations.—*Army and Navy Gazette.*

INFANTRY FIRE DISCIPLINE.

A most useful and instructive paper on "Fire Discipline," by Captain S. L. Murray, Gordon Highlanders, appears in this month's number of the *Journal of the Royal United Service Institution*, which all infantry officers would do well to read. Captain Murray, who has studied his subject attentively, now brings forward a definite series of simple fire-discipline exercises, embodying the principles he advocates. When he first expounded his views in a series of letters published by us his proposals were a little premature. The inevitableness of a mixture of units during the long fire fight at the "first parallel," and the consequent necessity of practicing the restoration of order in such a mixture, was only then beginning to be recognized in our army. Again, our independent fire had only begun to be controlled by the use of the whistle, which to many officers seemed sufficient progress for the moment. The necessity for further improvement was not, therefore, generally admitted. During the last three or four years infantry opinion has changed considerably in regard to these questions. There are probably now few officers who think that a mixture of units can be avoided. It is generally recognized that as line comes up behind line, if the first wave or two are checked, a mixture of units must follow, and it is felt by many that some uniform system of dealing with this difficulty is urgently required. At the big field-firing at Meerut in 1894 experiments were made as to the best method of reinforcing (*a*) by units closing as casualties occurred, (*b*) units mixing and being retold off into new ones, (*c*) a combination of the first two, units closing up to 500 yards and mixing, and being retold off after 500 yards. The report was that the third method was considered the best, which is the method recommended in the paper under notice. In 1894 40,000 rounds were fired at Poona to settle the question of the relative superiority of volleys or independent fire as regards results on the range, and in nearly all the experiments better results were obtained by independent fire.

In the United Kingdom many officers have tried various methods of telling off a mixture of units into new fire commands, though no uniform system has yet been formulated. In our small wars such a mixture of units should not arise as the enemy does not possess sufficient fire power to check our advance, and in small actions there is always suffi-

cient room for reinforcements to come up on the flanks; but in a large war, in a stand-up fight with civilized troops, such as we must also be ready for, the mixture of which we speak must certainly be expected. Its necessity would be at once apparent if on any field day the general in command were to order the first wave of the second line to consider itself checked at about 500 yards and reinforce it with the next wave, and were to order all attempts to advance to be repelled for half an hour or so. At the end of the time the enemy's fire resistance might be considered to waver sufficiently to permit the assault being pushed home. Such an object lesson in fire discipline would be interesting and instructive to all ranks, as it might easily occur on service if the enemy had perceived and strongly reinforced the point of assault. On the whole, it may be taken that infantry opinion is now ripe for a further progress in fire discipline. These proposals will be found in Captain Murray's paper, which we commend to notice. The fire-discipline exercises suggested appear to sufficiently meet the chief difficulties of a long fire against civilized troops armed with magazine rifles, and they possess the further advantage of extreme simplicity, so that they could be easily taught to the youngest soldier or the most rusty of reservists.

On one point we must disagree with Captain Murray, and that is in the use of the word "pell-mell formation." The word "pell-mell" doubtless gives a realistic idea of the mixture of units, but to many officers it is too much like "Pall-mall" and gives occasion unto the Philistine to blaspheme. We would suggest, therefore, that if the authorities now see their way to adopt Captain Murray's carefully thought-out proposals that the term "mixed formation" should be substituted for "pell-mell formation." With this exception we are at one with Captain Murray's ideas, which we support to-day as we did four years ago. Now that the question has been reopened, we hope that practical progress in fire discipline may be achieved, which is urgently required to meet modern battle conditions—*Army and Navy Gazette.*

THE FRENCH ARMY.

Not only the French press but the whole nation is now deeply interested in the formation of the fourth battalions that are to be added to each infantry regiment on the eastern frontier. Thus sixteen regiments would be increased by one battalion, and it is proposed that the cadres are to be formed in great part from the regiments themselves. This appears an unwise plan, for to strengthen the existing three battalions of each corps each must in a measure reduce its own efficiency in order to furnish its new brother with what is required. This process of reasoning would appeal forcibly to those fortunately few regiments in our army which are endeavoring to carry out a similar reinforcement. In case of war on the Eastern frontier of France, from which may God long preserve her, the duties of the 11th Division, which it is proposed to reinforce at once, would be to bear the first brunt of the enemy's invasion.

Would it not be a wiser plan, then, to form supernumerary battalions in the regiments watching the English Channel or the Spanish frontier, in which direction no danger exists, and to send them when properly constituted with the prestige of some years' existence to reinforce the troops watching the Rhine? Otherwise the system will be simply to skim the cream of the frontier battalions and to create with the material thus obtained regiments whose officers, non-commissioned officers, and men will be strangers to one another, and whose efficiency for years to come must necessarily be of not a high order. France cannot in this matter be accused of a servile imitation of her powerful neighbor, for she is reinforcing her army in a manner which Germany, by the suppression of fourth battalions already constituted, is deciding, doubtless for good reasons, to abandon. The measure will be a popular one in the country, no doubt, for several reasons. Locally new barracks will have to be built, new ranges formed, new drill grounds acquired, new officers will require accommodation; all this will mean much money spent locally. Moreover, the augmentation of the forces will probably lead to a further diminution of the length of service, for France, rich as she is, cannot much increase the sums spent on her forces, and thus a great temptation exists to send to their homes only partially-trained soldiers to economize the expense of their keep. And amongst the extreme Radical section of the population, always, alas, too numerous in France, the agitation in favor of a reduction of the length of the soldier's service from three to two years, or even one year only, goes on steadily increasing.

We have been accused only too recently by our lively neighbors of being without sympathy for them. Such is not in reality our position. It is not in the interests of England to see a further diminution of the fighting power of France. It is most improbable that either her force will be turned against us or that ours will be directed against her. France and England can mutually watch without jealousy or fear, the first the development of our sea power, the second the strengthening of France's land forces. It is with regret we see that the decreasing 40,000,000 of France are beginning to be unable to cope with the increasing 50,000,000 of Germany. But we do not think that a reduction of the already short term of service demanded from each Frenchman who arrives at the age of twenty years can possibly benefit the country. In Germany two years may be sufficient to make a capable and steady soldier; though such is not the opinion of many capable German military authorities. But in Germany the race possesses in a greater degree than any other European nation those characteristics which enable it to submit to the almost excessive demands which are made upon the soldier's patience, endurance, and self-control. A month's residence even in a German garrison town will make this fact patent. In France this is not so. No one can deny the military spirit of the Gaul which he inherits from Vincingetorex; nor his inventive genius, nor his famous "furia francese." But in France "the idea of liberty," to use the words of her own

War Minister, "has become a dogma." The individual has become impatient of control, and has quite lost the aptitude for submitting to a really severe discipline and the unswerving obedience to superiors which it exacts. These are some of the results of that searching after an impossible equality, which does not exist even betweeen sons of the same parents, which the republic inculcates to the detriment of the real blessings of liberty and fraternity. The *Avenir Militaire*, in a long article which does it credit, in a country where chauvinism has become almost a natural worship, shows forth with wondertul truth this side of the national character. In twenty-two months, for this is the time really available for instruction in the so-called two-years' service, it may be possible to teach a man how to handle his arms correctly, and to turn out on parade in a tolerably smart manner, but it is not within human powers to make a really thoroughly disciplined soldier. Unfortunately for France, the Radical element, already jealous of the army, in which it sees an instrument ready to the hand of authority to repress disorder, does not or will not understand that an armed militia cannot possess that solidity which is essential to success in war, and is particularly necessary in the case of first reverses. This party is determined to make the reduction of the length of the soldier's service a cry at the next election. It will probably be a successful one, for the peasants, every one of whom possesses a vote, will be attracted by the possibility of a quicker return of his son or brother to the *foyer* to help to pick the grapes or store the corn. If this short-sighted want of patriotism is persisted in it is difficult to see how France can fail to drop behind in the struggle for life as a great power. The proposed reduction of the minimum height of the soldier will at best only give a few thousand extra men per annum. The cry for more fortifications, which in spite of wiser determinations seems to be again rising, will, if complied with, only result in immobilizing more men in a force already numerically inferior to its probable adversary. Our belief is that it will be the height of folly, and we speak in France's interest, to further reduce the period of service with the colors. Every moment of the already short time at their disposal is necessary to hard-working French officers and instructors to make soldiers out of the raw material; and it will be better for the country to possess a force of comparatively small numbers, but carefully prepared for battle, than masses of undisciplined troops who will melt away at the first reverse and will become a greater danger in ordinary times for France than for her adversaries. There are not wanting signs that a reaction may set in against the present depopulation in France. Healthier and wiser ideas may prevail, and in a few years statistics will perhaps prove that in numbers and discipline, as well as in the general progress of civilization, France will, as before, merit the appellation of *La Grand Nation.—Army and Navy Gazette.*

THE FOURTH BATTALION.

Translated by CAPTAIN JAMES FORNANCE.

Thirty battalions are going to be organized by the end of this month. With the resources at the disposal of the recruiting service it is hoped that inside of two years all of our infantry regiments will be composed of four battalions. We will thus have gone back to the law of 1875 as to army organization, from which we should never have departed. This directed that each regiment of infantry should be composed of four battalions of four companies each, and two depot companies. This very reasonable organization was perfectly suited to every possible exigency of mobilization.

The majority of these fourth battalions, which are to be organized, will belong to the frontier army corps. Thus, in the sixth corps, the fourth battalions of the 26th, 69th and 79th regiments will be stationed at Toul and Neufchateau, and in the 14th and 15th corps, seven regiments out of eight will receive a fourth battalion. The officers of these new battalions are at present included in the total strength of the regiments, so that there will be no additional appointments made.

The selection of the stations has, however, presented some difficulties. Every municipality in each section had made some proposal. The Minister has made the almost uniform reply: "Build barracks in which every law of hygiene is observed, guarantee an excellent quality of water for the troops, and I will send you a battalion." These demands are, after all, very moderate. The presence of a battalion in a town naturally causes a very sensible increase in the revenues. Sure of these future benefits, municipalities ought first to advance the funds necessary for the comfortable installation of the soldiers. The question of a proper water supply has an undoubted importance.

During the twelve or thirteen years that military authority, and especially Medical Inspector General Dujardin-Beaumetz have watched over the water supply and ordered that it must be filtered, the mortality in the army from typhoid fever has decreased by more than two-thirds. The lives of from 4000 to 5000 young soldiers have been saved each year.

Whatever method may be adopted for raising these fourth battalions, their creation will not require more than two years. This is a reform, or rather a return to old ways over which we cannot rejoice too much. The German army is also going to have its regiments full. Even in 1887, each regiment of the German army was composed of three battalions and two companies, say three and one-half battalions. It may be remembered that in order to obtain this increase of effectives, the Emperor was compelled to dissolve the Reichstag and appeal to the electors.

This occurred in 1887, the day after the Schnaebelé incident. But, since then, the imperial government has without noise, without soliciting a vote, finished the work it commenced; the fourth battalions have been in existence since last January, so that the German army has now 692

battalions of the line, plus 19 battalions of chasseurs, say 711 battalions, although the law of July 15, 1893, had only provided for the support of 538 battalions and 173 half-battalions.

During the last century the organization of our infantry has undergone some singular changes. While at the beginning of the Revolution the infantry regiments had only two battalions, the Restoration found eighty regiments with three battalions; in 1870 the infantry consisted of 366 battalions of eight companies. It is easy to see that real advantages will be obtained from the new organization. For example, in 1854, at the beginning of the Crimean War, each infantry regiment of the expeditionary corps was formed of two battalions only, the third remaining in France as a depot battalion. In 1870, the depot battalions were able to supply the armies of Paris and of the Loire with about 350 battalions. They are then absolutely necessary; but on the other hand it was necessary that the regiments in the field should be formed of at least three battalions.

In reference to the formidable armament which gives Germany, for a time at least, an overwhelming superiority, deputy Richter, chief of the radical party, recently made an interesting speech at Remscheid. It was last December that the committee on expenditures voted in silence and without an objection, 150 million marks for the new armament. M. Richter stated that the military attachés in whose presence the experiments with the rapid fire cannon had been made, were absolutely astonished at the wonderful results; and in order to increase their surprise and give the foreign governments a wholesome fear, the Minister of War in person wished them to understand that all the frontier corps were already armed with this superior weapon.—*Figaro.*

October 10, 1897.

THE TRAINING OF ARTILLERY SCOUTS.

The following suggestions are made by Captain F. R. Maunsell, R. A., in the "Proceedings" of the Royal Artillery Institution, with a view of improving the performance of the reconnaissance and scouting duties of artillery in the field.

They chiefly consist in proposals for training a certain number of non-commissioned officers in each battery whose duties would be:—

(1.) To assist officers in reconnoitring positions for guns and the means of approaching such positions.

(2.) To act as combat patrols to protect against surprise.

(3.) To be employed in an officer's patrol detached to a flank to observe the effect of our own fire, or give information of movements within the enemy's position.

(4.) To act as orderlies to connect the C.R.A. with the various brigade divisions and these with the battery commanders.

(5.) For orderly work in keeping touch with the ammunition columns during an action.

The greater efficiency of gun and rifle fire has, observes Captain Maunsell, rendered a frontal attack difficult without great sacrifices; and it becomes increasingly important to train troops to manœuvre, to execute wide turning movements, make long marches by day and night, and utilize to the utmost every favorable feature of the ground. The use of smokeless powder will help to hide the real position of men and guns in attack or defense and will favor surprises and ambushes, while it will also induce greater circumspection in the attack to avoid being drawn into a useless display of force, or being committed to an impossible or dangerous situation. It is plain that if the attacker is to execute long manœuvre marches and keep much hidden from the enemy, or if the defender is to ward off the disadvantage of an unexpected attack, it is very necessary to study every portion of the ground and the best means of utilizing it in attack or defense. Also considering the improvements in modern weapons and the greater power that these place in a commander's hands for decisive action, the importance of reconnaissance work has much increased, and, if turning movements and similar manœuvres are to be successful, a careful study of the ground must form the principal preliminary towards attaining such a result.

In the artillery, the arm that has to commence the fire action, the value of a previous reconnaissance is of primary importance. In the preliminary portion of the action, when the advanced guard batteries, or horse artillery with the cavalry division are sent forward to reconnoitre and make the enemy disclose his position, opportunities will occur for R.A. officers' patrols to examine the ground with a view of occupying it subsequently with the main line of guns or discovering the probable position of the enemy's guns and how such would appear from the side of the attack. This need not interfere with the cavalry patrols or reconnaissance, but is purely technical work from an artillery point of view, carried out with a view of gaining the greatest advantage from the ground when the artillery duel commences later. If such R. A. officers' patrol comprised, in addition to the officer, some non-commissioned officers who had been previously trained in reconnaissance work, reading maps, etc., a very thorough study of the ground could be completed in the short time that would probably be available. Also the appearance of the target which the enemy's line of guns would present, how far they could be screened from view from our position, or the positions of their wagons and limbers, might be discovered from some point of vantage, and would be of great value when pointed out on the arrival of the C.R.A. and the battery commanders later. At the commencement of the artillery duel the whole of the batteries should open fire simultaneously and, if possible, make their fire come upon the enemy in the nature of a surprise, and it is only by a knowledge of the ground beforehand that such a result can be attained. Some of the batteries also may have to use indirect fire at this stage to get the full value out of the formations of the ground. The value of the men who had previously been with

the officer's patrol would now be obvious, and they could be of great assistance to the battery commanders in taking up position, in pointing out the target offered by their guns and the general line of the enemy's position. When in action they could be employed as combat patrols to guard against surprise or form part of an officer's patrol posted to observe the effects of our own fire from some advantageous position on the flank, give notice of the massing of troops and guns for a counter attack, and prepare the C.R.A. for meeting such by artillery fire. With the assistance of these men when taking up position, the Nos. 1 could be trusted to act as ground scouts, and these latter would not be found necessary. The name "combat" patrol has scarcely the same application to artillery as to cavalry, and "observation" patrol might more clearly denote the duties in the artillery arm.

Machine gun or magazine fire from a covered position can render a sudden attack on a line of guns very deadly to men and horses, and must be guarded against. The absence of smoke makes the progress of the battle difficult to follow, and to guard against surprise, these patrols have to be constituted of well-trained men, accustomed to act in detached positions of responsibility. In executing long marches, to turn the enemy's flank or force him to fight on unfavorable ground, it will be necessary to know the state of the roads, how far they are covered from view and fire, and the most suitable position for guns near them, in case of sudden orders to come into action. An enemy, well on the alert, may not suffer the turning movement to proceed, but will strengthen his flanks, and thus a very probable result will be a hot frontal action commenced suddenly on entirely new ground, the defender being compelled to fight on a field on which he is unprepared and towards which he has to hurry his reserves. Here again it will be obviously of great advantage if the C. R. A. of the attack has at hand a few officer's patrols with trained scouts to assist in reconnoitring the new ground and the best positions for the attacking batteries. When the guns are in position and have to act in mass, a certain number of men will be required as orderlies to keep up communication between the C.R.A., the lieutenant-colonels commanding the brigade divisions, and the battery commanders. In action this orderly duty will certainly be difficult, and will require a man whose intelligence has been quickened, and knowledge of ground improved by a course of training in map-reading and scouting work. Connection has to be kept up with the divisional ammunition columns, and orders should reach them rapidly from the front; this will require orderlies accustomed to map-reading and finding their way across country.

To carry out the various duties which have been outlined above, it is suggested that four non-commissioned officers be trained per battery in peace time, and on mobilization be added to the present war establishment and be available for detached duties when the need arose. The post of scout might be made a coveted position for young non-commis-

sioned officers and a small increase of pay attached to it. Men who have passed through this training and risen to the rank of sergeant No. 1 would be thereby more fitted to lead their sub-divisions into action or across country. Major May, in his lecture on the "Analogy between the tactics of Field Artillery and those of other arms," has described the system of employment of scouts introduced by General Tyler in India, and alluded to the difficulties of training men on home service, but much may be done by extending and making more real the course of winter reconnaissance in which non-commissioned officers are now directed to be instructed. After this course it would perhaps be better to complete the men's training by having a small camp of instruction, held in the spring and lasting about a fortnight, at some part of England or Ireland, where plenty of open ground would be available to work over. The men would then be ready for further training at the larger manœuvres later in the year. These camps need not contain more than 24 men, or the trained men from six batteries under an officer as instructor, and would be analogous to the small signalling camps that are to be seen in the summer near Aldershot and elsewhere. This would not entail much expense, and the time the men would be away from their batteries would not be excessive. The training at a central camp would insure uniformity in the winter training of the batteries, and enable more extended combined exercises to be undertaken. The system of training should aim at producing a clear and concise report of a position, road or section of ground; and it will probably be necessary to have some form of rough sketch attached to make it clearer, and to indicate points referred to in the report.

Such a sketch should be devoid of all elaboration and the system so simple that any non-commissioned officer, after due training—whether he be a skilled draughtsman or not—should be able to apply rapidly and effectively. Scouts will have very little time to complete any form of sketch, and the only materials likely to be at hand on service are a small compass, notebook, black pencil, and ruler. If the sketch were to be of a road, the villages, cross-roads and principal details could be marked on the paper beforehand from a map in the possession of the officer sending the man out. This would form a rough outline which the scout could fill in as he went, so that his remarks in the margin, together with the sketch itself, would form all the report required. Similarly, if sent on a mile or so ahead to report on a position, the limits of the ground and any prominent features, such as line of a stream, the distance between villages on or near the crest, should be marked in his note-book from the officer's map, and the man sent to complete the necessary information by writing it on the face of the sketch. In a great many cases, however, sketches of any sort could not be thought of in the hurry of active service, but still it should be possible for a trained man to write down concisely how the ground lies to the front of the position, what villages or stretches of road are visible, which are hidden by trees, whether the view

is clear into the valley in front, any heights commanding the position, what sort of cover there is along its crest, and what the slopes in the rear are like, ways of approach, and so on. Even this much, without any sketch, but referred to a map in the hands of the officer who receives it, will be of great use. But, in order to train a man to write such a short report as that indicated above, he must in peace time be taught a certain amount of simple sketching and map-reading, to accustom his eye to take in the shape of the ground, to impress on him the points he should report on from an artillery point of view, and teach him to find his way about without the aid of a map if employed on isolated duty.

An officer sent with three or four trained men to report on positions suitable for artillery might divide up the ground for each man, giving him an outline sketch of a certain section with the principal points marked and instructing him to fill in necessary details. Or, similarly, an outline of two or three miles of road may be given him to report on. Artillery scouts would scarcely be likely to be called on to do much sketching of entirely new ground, and some principal points and distances would usually be available to assist them. Their work would rather take the form of reporting on ground the general formation of which is already known, filling in the necessary detail from an artillery point of view, partly in the form of writing and partly in the form of a sketch. For ordinary use a large note-book, compass, ruler, and black pencil should be sufficient. The note-book should be about the size of the message book supplied for army signalling, such as Army Book, 295 (A), but it would be more suitable if of better paper and if each leaf could be readily torn out. The compass should be of the pattern which can be clamped to the note-book at one side. This would allow details of the sketch to be filled in with the ruler in a similar manner to the cavalry sketching-case, and also admit of rough bearings being taken. The ruler could be marked with the scale in use, usually three inches to a mile. Contouring is not adapted to this form of rough work ; a system of vertical pencil strokes is suggested as more rapid and requiring little skill in execution. If the slopes are too steep for guns a note to this effect in the margin or on the face of the sketch would suffice. A short description of the view from the crest of a position, giving exactly what is visible in the field of fire, will be of great value from an artillery point of view. Especially is this case in the event of a scout being barred from advancing any farther than the crest by the enemy's patrols. It is suggested that ordinary roads, passable for artillery, should be represented by a single thick pencil line, as this would be easier and quicker to draw than the usual two lines. Paths and tracks impassable for guns might be represented by a thick dotted line ; enclosures, hedgerows, and such like to be represented by ordinary fine pencil lines ; houses in black pencil, and woods represented by the conventional sign for trees here and there. These would be the only conventional signs used, any special information about the road, whether fenced or unfenced, its

width, etc., being noted in the margin or on the sketch if it did not overcrowd it. It is essential that the man should be able to read maps and understand the conventional signs and the use of the north point. The 1″ Ordnance Map in England corresponds approximately as regards scale to the maps likely to be used on active service in Europe, and therefore should be used for training the men. In India the scale would usually be four miles to an inch, and would not contain so much detail as the 1″ map.—*United Service Gazette.*

THE ARTILLERY POSITION, AND SCREENING GUNS.

Captain C. D. Guinness, R.A., has taken advantage of the rearming of our artillery with guns burning smokeless powder to urge the question of artillery position and screening guns. Whenever dash is required and obstacles have to be surmounted our Royal Horse and Field Artillery batteries hold their own. At the New Forest manœuvres of 1894 the French military attaché, himself an artillery officer, repeatedly broke out in loud praise of the way in which our guns were manœuvred over rough ground, at a pace and in a style which he declared to have been never attempted even by his own artillery. Only some eight years ago we seemed to have been hopelessly left behind by foreign artilleries in the practical solution of such gunnery questions as ranging and the direction and distribution of fire in the field. Then it was, but not till then, that prejudices were overcome and our leading authorities gave up thinking entirely about mound drill formations, and set to work to elaborate that system of fire discipline from which so much may be expected in our next big war. It will be remembered with what fear and trembling some of the more conservative of Woolwich authorities regarded the new feature. But common sense asserted itself at length, and now those who most strenuously resisted interference with the old parade routine are ready to admit that we have made good progress. And so indeed we have. We ought not, however, to rest satisfied, and it is a source of no little satisfaction to find among the rising generation of gunners such a praiseworthy desire to press forward. Captain Guinness is all for progress—progress, that is to say, in field tactics. He does not deny that the last decade has been marked by great advances, but asking himself the pertinent question, "Are we fit to face a continental artillery in the great gun duel which ushers in the modern battle?" his reply is unhesitatingly in the negative. And why? Because we have failed to grasp one important feature of continental battle systems. In Germany and elsewhere the guns are concealed either behind a ridge or other cover, unlimbered, and ready to run up into action at the necessary moment, whilst ours appear always on the sky-line—a tempting target for the enterprising commander who knows how to snatch a victory.

In the British army at the present time the artillery commander occupies a by no means enviable position. He is required to select his

position, advance his batteries sufficiently forward to lay on the enemy's guns when they shall appear above the opposite crest, and trust that his majors will open fire first and that he will establish his superiority by sheer force of British pluck and endurance, if not by weight of metal. He may use the "direct" or the "deliberate" method of bringing up his guns, but in any event when the last signal to advance is given no one battery must be much behind the other in the race for the crest and for the honor of the first shot. Most artillery officers would carry out some such method as this if placed in command of several batteries on service, but few could be found to defend the principle of such tactics. Captain Guinness holds strongly that "concealment from view is better than protection from fire." He would have the guns brought out of the second line or retired position behind the crest, where they cannot see, to an advanced position where they would at least be able to take an intelligent interest in the battle as it progressed. The guns having been thus brought forward should be concealed from view (1) by making use of natural cover, (2) by constructing artificial cover, (3) by taking care that the background of the battery was unfavorable to observation of fire by the enemy. The proposals have so much to recommend them that we cannot bring ourselves to believe they will be disregarded. It is a fact placed quite outside the bounds of argument that the whole aspect of battle-fields will be altered by the recent adoption of repeating rifles and smokeless powder. This being so, it behooves our artillery authorities to accept the situation in a practical spirit. There is a tradition, we all know, that "Woolwich" is not to be moved lightly; but even conservative Woolwich cannot close its eyes to the teachings of military Germany if even the changes effected in other continental states may be considered of little importance. The Germans understand war, and it is not too much to say that they would not have upset old traditions unless they had assured themselves first that there was good reason for the step which was being taken.—*Army and Navy Gazette.*

Comment and Criticism.

"The National Guard National in Name Only."—A Reply.

Lieut.-Col. C. W. King, A. A. G., Ia. N. G.

ACCEPTING the kindly and courteous conditions offered by Colonel Frazier, in the September number of the M. S. I., as of a "friendly exchange of ideas," with relation to my criticism of his statements at issue concerning his article in the May number M. S. I. entitled "The National Guard National in Name Only," I have the honor to reply.

As I make no pretentious claims as a debater I had no thought other than the most friendly defense of what I believed to be correct, when writing the criticism referred to. It seems I have given cause to my esteemed friend and confrère to correct me in what I assumed to correct him upon, both smiling I hope, and feeling pleasant as I renew assurances with him that such is the case with me, and may it continue to be most pleasant with us.

When I mentioned what other writers had said with relation to this question, I had particularly in mind what has been written by that most worthy officer and gentleman, Colonel Rice, of the Illinois National Guard, and published in our M. S. I., from which I will take the liberty of quoting, and which articles I most cheerfully commend to be read by my worthy friend, in their entirety, together with the criticisms by Lieutenant Birkhimer, U. S. A., as the discussion between these gentlemen is upon the same line as has now again been brought before the members of the M. S. I. It only seems to me necessary to refer to the facts and sentiment shown by Colonel Rice, and add, that in the excellence of his exposition of facts, and in my humble patriot enthusiasm to endorse his sentiments, I can earnestly say they receive my sincere second. In the September number M. S. I., 1894, page 925, in his paper on "The National Guard," Colonel Rice says: "Congress has provided further that when the militia are called out, the order may be made directly upon the individual officers and men by the President, or may be made through the Governor of each State (see note of his). The latter mode is the better, however, when practicable, just as it is better as a rule to send all military orders through the regular channels." (See his note.) If this is true, and I have not seen it successfully contradicted, the statement of Colonel Frazier in his last, that "If the President should issue a call for troops, for the *members of the Guard, which has no national status*," etc. It follows then if true, that the Guard indeed *have* a *national status*, and having such, the President *has indeed* authority over them, as Commander-in-chief.

In support of what I have mentioned, by referring to the Iowa law and which Colonel Frazier quotes with reference to when a requisition shall be made by the President, etc., we learn from Colonel Rice again that the President, who may order out, issue a call, directly or indirectly to the officers and men of the Guard, is restricted in what he may do with them. "The President would not have the right to disorganize them or reorganize them, but in every

other respect it would be his duty to treat them as a part of the Volunteer or Regular army, and expect a like service from them." (March M. S. I., 1896, page 299.) It is not my purpose to contradict what Colonel Frazier is pleased to offer regarding the "just two methods * * * for securing the military services of men." I think we are agreed that the National Guard service is that of the volunteer. In contravention of what Colonel Frazier is pleased to consider "A reasonable interpretation" of the enlistment oath, as quoted from the Iowa law by me, I again refer to Colonel Rice, in the November number M. S. I., 1896, page 458, for that part referring in particular to the Commander-in-chief, he says: "By enlisting he promises and agrees, and by his enlistment oath in my State, and I suppose in others, he also swears to support the Constitution and laws of the United States (see Iowa enlistment oath), and of his own State, and to obey the orders of his Commander-in-chief His Governor is his Commander-in-chief when he is in the State service, and the *President*, according to the Constitution of the United States, which he has sworn to support, is his Commander-in-chief when he is in the service of the United States, and there is no limitation made in the Constitution or laws of the United States or of the State, or in the enlistment, or elsewhere, as to where he shall serve or what service he shall perform. He promises and agrees and is universally willing to do whatever a good soldier ought to do." Now as to that part of the oath he quotes—"or you cease to *become* a citizen thereof" needing correction—possibly it does, possibly some one too wise in his own conceit, might conceive the idea that in the face of an order to report for duty, all that would be necessary to dodge the issue, or in other words evade the order, would be to have sudden though imperative business in an adjoining State, and in short—out of State, out of service—such action would not prevent the authorities, from whom he had vanished, from issuing a *Dishonorable Discharge* on account of *desertion* in the *face* of *duty*, rather than receive which there's not a true American but that would rather die, supporting his sacred honor, than to entertain the thought that a single countryman should look upon him as disloyal and not honorable to our glorious Stars and Stripes. I wish to extend the hand of true fellowship to Colonel Frazier for his sentiment of good will and interest in the new movement to better the National Guard, and when it comes to whatever may be for the best interests of the National Guard, I desire to say I am simply enthusiastic to do such as will be for its advancement, and if I err in judgment or technical assumption, may my correction be speedy and sincere.

Reviews and Exchanges.

Grant.*

IN the introductory chapter of this latest life of General Grant, Colonel Church says: "However opinions may differ as to the relative merits in a strictly military sense of the men who led our troops to battle, few will dispute the fact that the chief representative of the Union armies was Ulysses Simpson Grant." He then proceeds to show, "How it happened that a man so free from the passions supposed to dominate the soldier succeeded in the great game of war, where so many others failed. * * *"

Colonel Church proves his proposition in a way that holds the attention and keeps up the interest of the reader from the first to the last page of the book. A short chapter of eighteen pages is devoted to the birth, ancestry, and education of his hero. The early traits of character, particularly Grant's fondness for horses and faculty of managing and mastering them, are prominently brought out, and later on we are made to see how these traits developed the character and influenced the actions of the man.

The next two chapters give us Grant's first experiences as a soldier in the war with Mexico, give the story in full and the real cause of his leaving the service and explain why he failed as a farmer and a man of business. There is much that is new and particularly interesting in these chapters of the book.

Chapters V. to XX. cover the period of the Civil War and up to Grant's election as President of the United States. With the aid of maps and plans one can follow his connection with the Civil War from May, 1861, to the close, and thereafter his influence on the great events immediately following the war. The military reader will find much that is valuable and instructive, the general reader will have his interest developed and held throughout. Colonel Church makes it very plain why the stone which was several times rejected finally became the head of the corner.

Chapters XX.–XXIII. deal with the great events during Grant's two terms as President of the United States. The salient traits of his character as brought out by the questions arising during this critical period of our history, and their imprint upon events are told in a manner to make the greatest impression upon the mind of the reader and convince him further that Colonel Church has failed in no respect to fulfil the task set himself in the introductory chapter of the book.

In Chapter XXIII. are related the events connected with General Grant's two years' trip abroad and the honors received by him during his journey around the world.

The heading to Chapter XIV., "Fortune's Sharpe Adversité"—"The End," brings to mind the sad events crowded into Grant's career from 1880 to 1885.

**Ulysses S. Grant and The Period of National Preservation and Reconstruction. Heroes of the Nations Series.* By William Conant Church, Brevet Lieutenant-Colonel U. S. Volunteers; editor *U. S. Army and Navy Journal*; author of "The Life of John Ericsson," etc. New York. G. P. Putnam's Sons. 1897.

A proper finale is "Let Us Have Peace," followed by the tomb on Riverside Drive, New York.

The book is attractively gotten up, the print is large and clear, facts which greatly enhance the pleasure of reading.

There is no American who cannot profit by reading Colonel Church's Grant.

The Synchronograph.*

The above is the name given to the combination of instruments for rapid telegraphy by the alternating current invented by Professor Crehore, Ph.D., of Dartmouth College and Lieut. G. O. Squier, Ph.D., Instructor in Dept. of Electricity at the Artillery School, Fortress Monroe, Va. The invention was announced in papers read before the Societies of Electrical Engineers of New York and Chicago by these gentlemen last April.

It belongs to that class of telegraphy called "machine telegraphy" in which a message is prepared at the sending end, by punching out the signals to be sent, on a strip of paper, this strip being fed through the transmitter at a high speed. The speed in previous systems has been limited by—first, the strength of current which could be used; and second, the retardation effects produced on long lines when a current is made and broken, thus causing the signals to be "mutilated," as it is called, or run into each other.

These difficulties are very cleverly avoided in the Synchronograph by using an alternating current instead of a direct or battery current, and opening or closing the circuit *only* at the instants when the current strength passes through zero, which occurs at each alternation. The paper strip having the message punched out on it is run around a wheel, which, for simplicity, may be attached to the armature shaft of the dynamo, a metallic brush bearing on the periphery of the wheel and strip, and connecting to the line. Suppose there are twenty alternations of the current during each revolution; then twenty spaces on the wheel and strip would correspond to these, and the breaks and makes produced by the paper strip and punched spaces could be made to just coincide with the instants of zero current. Thus missing one or more alternations corresponds to dots and dashes of the telegraphic alphabet.

In this and several other systems, the message is received on a chemically prepared strip of paper, on which the dots and dashes are inscribed by action of the current as the strip is rapidly fed under the end of the wire or wires. The inventors also describe a method of receiving the message on a photographic plate in their Photo-Chronograph, where the current admits or shuts off a polarized beam of light to correspond with the dots and dashes.

During their early experiments they attained as high a speed as three thousand words a minute over a single wire, and it is reported that a higher speed has since been reached.

The inventors claim great advances in the use of the telegraph due to such speed—among which may be mentioned that business correspondence can then be carried on largely by telegraph at a cost little above that by letter. That is, the mails can go by wire instead of by rail. And next, that newspapers can

* *The Synchronograph. A New Method of Rapidly Transmitting Intelligence by the Alternating Current.* By Albert Cushing Crehore, Ph D. and George Owen Squier, Ph.D., First Lieut. of Artillery. Transactions of the American Institute of Electrical Engineers.

be printed simultaneously in many cities, since one hour would suffice to send the entire contents of a large daily over a single wire. During the summer the British government has given the inventors every assistance in experiments, and it is reported that some highly successful tests have been made.

E. R.

Report of the Tests of Metals and Other Materials for Industrial Purposes, Made at Watertown Arsenal, 1894-95, by Major J. W. Reilly, Ordnance Department, U.S.A.*

Considering the ever active forces at work to destroy metals and other building materials, and the ever present necessity of reducing cost, the engineer has a continual battle with the problem of so building his structure as to secure the greatest safety and durability and consume the least material. The production of proper qualities of these materials is, both to engineer and manufacturer, a question of the survival of the fittest.

To aid in the solutions of problems involving the strength of materials and also to standardize, so far as possible, all tests pertaining to industrial materials, the United States testing machine has been set up since 1880, at Watertown Arsenal, Mass.

The results for two years of work lie before us in bulky volumes which contain a mass of information, the value of which can only be fully appreciated by those to whom such knowledge is a necessity.

We have uniform measures of quantity; why not also uniform measure of quality of metals? The yard or metre, pound or kilogram, quart or litre, are the same everywhere. But the quality of a ton of steel is determined chiefly by the more or less fragmentary knowledge which the engineer or consumer may happen to possess of the properties of steel. If we may add to this the honest differences that may arise as to the value of a certain method of testing, then we have as a result a variety of opinions and methods not altogether warranted by facts or suitable in other ways.

None but those who have to deal with such problems know how different are the measures of quality of steel for instance. Each State and city almost has a different measure, and a recent engineering article states, "we often find different measures in the same building if not in the same engineer office."

Towards the unification of methods of testing and the determination of a measure of quality which shall satisfy the engineering world, the labors of those who have prepared these volumes must prove of greatest value. Undertaken by Government and prosecuted with the most painstaking care after the most approved methods and without regard to certain commercial considerations that of necessity must enter into the efforts of a private individual, or even of a corporation, this work must possess the qualities of a standard and tend to that unification so much desired in certain arts.

The object of all testing and inspection of iron and steel, with few exceptions, is to ascertain the rate of flow of a given metal and the force or load necessary to make it flow. The former indicates the degree of ductility and the latter its strength. Now if different methods are adopted to determine this rate, the results of one test will in all probability differ from those of another, and the engineer or consumer may deceive himself by just such difference. But if

* Government Printing Office, Washington, D. C.

methods of recognizable excellence can be determined upon and used then these difficulties vanish for both classes.

But it is not alone of iron and steel in the form of test pieces that is here in question, shapes without number appear before this measurer of strains and stresses. Tackle blocks of unusual capacity for the Navy; chain cable, shackles, et., for the Light House Board, and material representing the steel forgings for our sea-coast guns and carriages, together with numerous articles and substances from private sources were all grist to this mill.

Perhaps the most interesting of these practical tests were those relating to the determination of fibre stresses of rails and the depression of rails and roadbed in the vicinity of a passing locomotive. So little is known of the action of roadbed and ties that a determination of these fibre stresses in rails necessarily becomes a subject of experimental inquiry and opens up a wide field of usefulness through the assistance this must afford in the drawing up of suitable specifications for the material of rails, if in nothing else.

The large number of laboratory experiments become of greater value and their application most satisfactory, when supplemented by such direct inquiries as those indicated above, and it is intended to extend them to the practical determinations of strains in existing structures.

But considerations of space forbid further exposition of this useful work, and it only remains to compliment Major Reilly on the orderly presentation of this mass of new material under his supervision. Few but those who have had it to do can appreciate the amount of painstaking labor involved in the accurate and proper production of such an array of facts and figures.

K.

Physical Drill for Foot Troops.*

This convenient little mannal is put forth to meet certain demands arising in the daily experience of those whose duties may require them to give instruction in physical exercises.

The drills forming the subject matter have been practiced in the army to such an extent that, while not specifically authorized, they have, through use, acquired that sanction which custom gives. Hence, in this way, they have authority enough to warrant the belief that the National Guard and Schools will find them sufficient for all practical purposes.

The works from which the material of this booklet is taken are not commonly available, and thus the pamphlet will save the trouble of hunting for this information on the part of those who wish all the essentials of physical drill but have not the time to adapt the means to their own immediate ends in the matter of such instruction.

The little work is well illustrated and printed, and should serve a useful purpose.

A.

* *Physical Drill for Foot Troops.* Compiled by Captain Constantine Chase, 4th Artillery, U. S. Army. Washington, D. C.: James J. Chapman. 1897.

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Prize Essay—1898.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal, together with $100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and $50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September* 1, 1898. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1897, for the Prize Essay of 1898, is

"OUR WATER BOUNDARIES AND OUR INTERIOR WATER-WAYS; HOW TO UTILIZE AND DEFEND THEM; THEIR INFLUENCE IN CASE OF INVASION."

III.—The names of the members of the Board of Award will be announced in the JOURNAL for January, 1898.

GOVERNOR'S ISLAND,
Nov. 1, 1897.

JAMES FORNANCE,
Secretary.